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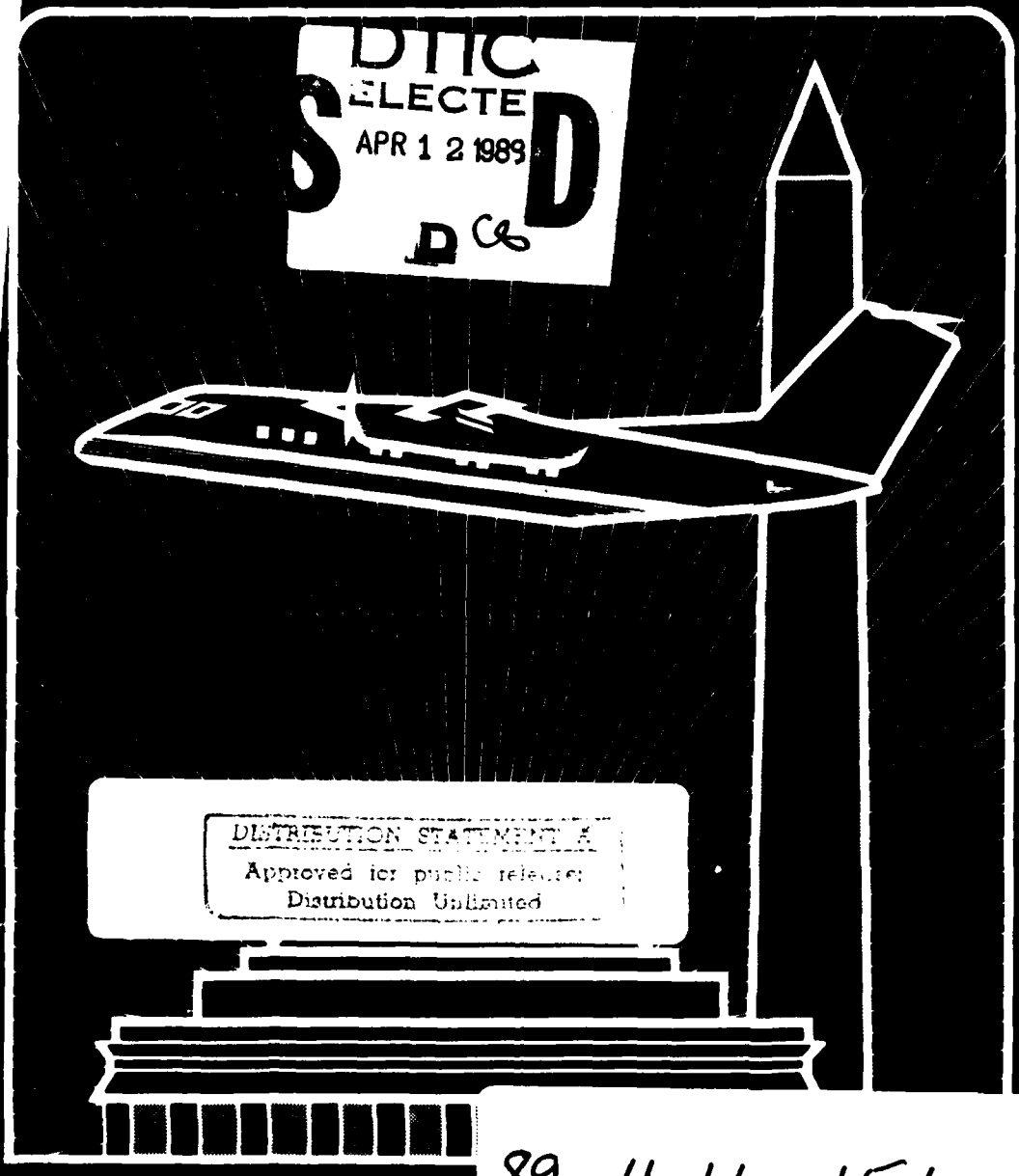

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16. Abstract

This report contains the Fiscal Years 1989-2000 Federal Aviation Administration (FAA) forecasts of aviation activity at FAA facilities. These include airports with FAA control towers, air route traffic control centers, and flight service stations. Detailed forecasts were made for the four major users of the National Aviation System: air carriers, air taxi/commuters, general aviation and the military. The forecasts were prepared to meet the budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, by the aviation industry, and by the general public.

The overall outlook for the forecast period is for continued economic growth, rising real fuel prices, and moderate inflation. Based upon these assumptions, aviation activity by fiscal year 2000 is forecast to increase by 31.0 percent at towered airports (commuters, 51.8 percent; air carriers, 34.6 percent; general aviation, 27.5 percent; military, 0.0 percent), 32.0 percent at air route traffic control centers (commuters, 55.2 percent; air carriers, 33.7 percent; general aviation, 30.0 percent; military, 0.0 percent), and 7.8 percent in flight services performed. Hours flown by general aviation are forecast to increase 14.9 percent and helicopter hours flown, 82.6 percent. Scheduled domestic revenue passenger miles (RPM's) are forecast to increase 73.6 percent, with scheduled international RMP's forecast to increase by 104.9 percent; and regionals/commuters RPM's forecast to increase by 158.7 percent.

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PREFACE

The Federal Aviation Administration (FAA) forecasts of aviation activity and other selected statistics are developed annually for use in the agency's planning and decisionmaking. Aviation activity under the control of FAA towered airports and Air Route Traffic Control Centers, and the services provided by the Flight Service Stations are forecast for several user groups--commercial air carriers, commuters/air taxis, general aviation, and the military.

For the period 1989-1994, FAA aviation forecasts use projections of key economic variables provided by the Executive Office of the President, Office of Management and Budget. For the period 1995-2000, FAA aviation forecasts are based on consensus growth rates of key economic variables provided by Data Resources, Inc., Evans Economics, Inc., and The WEFA Group. These projections are combined with projections of aviation variables and professional judgment on the probabilities and consequences of events that affect aviation. The combination is used as input to the econometric models from which the forecasts are generated.

The forecasts developed by these models and presented in this report indicate that aviation activity should continue to grow at about the same rate as the general economy. The projected total system demand was not specifically constrained as a result of potential capacity problems at some major U.S. air terminals. We presume that if capacity problems develop at individual sites, alternative methods of providing capacity will evolve within the system. Of special concern are indications that the number of general aviation airports may be declining at an accelerating rate. The importance of these airports for feeding the system with both passengers and new pilots cannot be overlooked. Also, there is the impact of constraints on the construction of new runways and major new airports because of increased community resistance to aircraft noise. In order for the forecasts of this report to be realized, noise impact and the resultant restrictions on capacity and system growth must be dealt with at an early date. The forecasts assume that these threats to orderly growth are manageable and that there would be only minor perturbations to the long-term growth expected for the industry.

Of special interest in this year's report is the expansion of the international air carrier traffic forecast to include a breakdown between Atlantic, Latin America, and Pacific markets. Also, an analysis of changes in the commercial aviation industry after a decade or deregulation is included in the report.

John M. Rodgers
Director of Aviation Policy and Plans

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CHAPTER I

EXECUTIVE SUMMARY

CHAPTER I
EXECUTIVE SUMMARY

October 1988 marked the tenth anniversary of the Airline Deregulation Act. During the past decade we have witnessed a number of significant structural and operational changes in the commercial aviation industry. The industry has gone through three distinct phases: (1) expansion (from 30 large air carriers in 1978 to 105 in 1985), (2) consolidation (11 mergers and 16 buyouts of smaller regionals/commuters in 1986-1988) to 61 active carriers at the end of 1988, and (3) concentration (4 largest carriers accounted for 60.4 percent of traffic in 1988--up from 52.5 percent in 1978). The regional/commuter airlines have experienced similar changes, with the number of carriers increasing from 210 in 1978 to 250 in 1981, then declining to 170 in 1988. In addition, the regional/commuter airlines have become increasingly integrated with the large scheduled air carriers through code-sharing agreements and/or through acquisition in part or totally by their larger partners. Airlines have changed the structure of the routing system from predominantly linear operations to a system of hub and spoke. The development of connecting hub airports has led to high frequencies in peak hours at major air carrier airports and has significantly increased the demand for FAA services at these airports. The U.S. deregulation experience has become a model for the rest of the world and we may, over the next decade, witness the gradual spread of airline deregulation throughout a large part of the free world. As the current movement toward world-wide deregulation progresses, it opens the possibility of the creation of multinational carriers throughout the world. The U.S. experience with code-sharing agreements between large air carriers and regionals/commuters suggests that smaller regionals/commuters benefit from working relationships with a larger airline. In future years, the same could hold true for competition in international markets.

Shipments of all types of general aviation aircraft, which have been cyclical since World War II, increased steadily during the 1970's, reaching a peak of 17,811 units in 1978. However, general aviation aircraft shipments registered declines in each of the next 10 years. The single engine piston aircraft market is the base on which general aviation activity builds. Three-fourths of the aircraft in the fleet are single engine piston. When the single engine piston market declines, it signals the slowing of expansion in the general aviation fleet and, consequently, a slowing in the rate of growth of activity at many FAA facilities.

The FAA plans to meet forecast demands for the aviation system as reflected in this document. FAA must do this in a way that conforms with the guiding principles that the FAA will control but not constrain, regulate but not interfere. Although air carriers account for the largest proportion of air passenger traffic, the FAA recognizes its responsibility to respond to the needs of the individual who chooses solo flight. The primary objective is safe and efficient transportation for all people who use and depend upon the National Airspace System.

REVIEW OF 1988

In fiscal year 1988 the large U.S. air carriers increased system capacity (seat miles) 4.6 percent, which matched an increased demand (revenue passenger miles) of 4.5 percent. The net result was a slight decrease in load factor to 62.2 percent. This system growth was consistent with the prior year FAA forecast. However, the big surprise was the strong growth in international traffic and the weak growth in domestic traffic. International traffic increased 19.1 percent while domestic traffic increased only 1.1 percent. The airlines were able to maintain, through effective yield management and the avoidance of fare wars, an 8.2 percent increase in average fares. Although fuel prices increased during the early part of the year, they began declining during the latter half. Overall, the airlines' average fuel cost increased 8.1 percent over fiscal year 1987.

U.S. commercial airlines reported operating profits totaling over $3.1 billion in fiscal year 1988. However, the profits of only four carriers totaled over $2.1 billion, representing 67.7 percent of the total profits for the industry. One-third of the reporting carriers (10 of 32) incurred operating losses. The industry's net profit only totaled $1.1 billion, due largely to interest payments on long-term debt. The future viability of the industry and individual carriers will be highly dependent on the national economy.

Commercial aircraft orders increased by 15.3 percent during the year, and deliveries increased by 13.0 percent. Narrowbody aircraft orders and deliveries continue to outpace the demand for widebody aircraft. This reflects the air carriers' continuing reliance on schedule frequency to accommodate projected passenger demand.

In fiscal year 1988, general aviation aircraft shipments declined for the tenth consecutive year. Turbine-powered aircraft shipments continue to be stronger than the single engine piston aircraft shipments, resulting in a 6.5 percent increase in billings over fiscal year 1987.

In fiscal year 1988, air carrier operations at FAA air traffic control towers declined by 3.1 percent. The air taxi/commuter operations, however, exhibited a strong growth rate of 13.7 percent. In total, commercial activity at FAA facilities increased approximately as forecast (2.9 percent). General aviation operations declined by 1.6 percent. Total operations at FAA air traffic control towers were up slightly, instrument operations were up by 1.8 percent, and aircraft handled by the Air Route Traffic Control Centers increased by 1.0 percent.

In summary, the impacts of deregulation continue to alter the commercial aviation industry. The long expected recovery of the general aviation manufacturing industry has not materialized, but activity at FAA facilities continues to exhibit moderate to strong growth.

ECONOMIC FORECASTS

The overall outlook for the 12-year forecast period is for moderate to strong economic growth, increasing real fuel prices, and moderate inflation. Projected growth of aviation is consistent with the long-term economic growth forecast. It should be recognized that in any given year there may be some perturbation from the long-term trend, because none of the economic models is sufficiently precise to predict interim business cycles.

FAA FORECAST ECONOMIC ASSUMPTIONS
FISCAL YEARS 1989 - 2000

	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
ECONOMIC VARIABLE	1980	1987	1988	1989	1990	2000	80-88	87-88	88-89	89-90	88-2000
Gross National Product (Billions 1982$)	3,187.7	3,799.9	3,967.9	4,087.6	4,218.7	5,474.2	2.8	4.4	3.0	3.2	2.7
Consumer Price Index (1982-84 = 100)	80.0	111.2	115.7	120.3	124.9	188.9	4.7	4.0	4.0	3.8	4.2
Oil & Gas Deflator (1982 = 100)	90.4	75.8	76.8	64.5	70.8	139.0	(2.1)	1.3	(16.0)	9.8	5.1

Source: 1989-94 Executive Office of the President, Office of Management and Budget

1995-2000 Consensus growth rate of Data Resources, Inc., Evans Economics, Inc., and The WEFA Group

An economic downturn has been a possibility for several years but has not materialized. The stock market and related markets have still not fully recovered from the October 1987 decline. This creates a potential source of economic weakness. Budget and tax policy are also important to the economy, and the outcome of new administration negotiations with Congress, particularly the policy of no tax increases is uncertain. These forecasts assume there will be moderate growth and no economic downturn in 1989 and 1990.

AVIATION ACTIVITY FORECASTS

Domestic air carrier revenue passenger miles are forecast to increase at an annual rate of 4.7 percent during 1988-2000. During the same time period, domestic enplanements are forecast to increase by 4.4 percent annually, a rate somewhat slower than passenger mile growth due to longer passenger trip lengths. Air carrier aircraft operations are forecast to increase at an annual rate of 2.5 percent over the forecast period. The high growth in revenue passenger miles and enplanements relative to operations reflects the baseline air carrier assumptions of higher load factors, larger seating capacity for air carrier aircraft, and longer passenger trip lengths.

International air carrier revenue passenger miles are forecast to increase at an annual rate of 6.2 percent during 1988-2000. This high growth rate is being driven by the strong growth rates being projected for the Pacific Rim markets. During this same period, international enplanements are forecast to increase by 5.5 percent annually, a rate somewhat slower than passenger mile growth due to longer passenger trip lengths in the Pacific.

These forecasts were developed prior to the December 1988 Pan American crash. We do not expect that the crash, which may have been the result of terrorist activity, will effect 1989 overseas passenger traffic. However, the FAA has developed an econometric model to measure the potential impact of terrorism on U.S. air carrier North Atlantic operations and we will continue to monitor future activity.

In 1989, the regionals/commuters are expected to enplane 32.9 million passengers, 7.1 percent of all fare-paying passengers in scheduled domestic air service. By the year 2000, these carriers are expected to carry 65.6 million passengers and to account for 8.7 percent of all domestic passenger enplanements. Regionals/commuters are expected to continue the trend toward purchase of small jet aircraft and larger, propeller-driven aircraft.

AVIATION ACTIVITY FORECASTS
FISCAL YEARS 1989 - 2000

AVIATION ACTIVITY	HISTORICAL 1980	1987	1988	FORECAST 1989	1990	2000	PERCENT AVERAGE ANNUAL GROWTH 80-88	87-88	88-89	89-90	88-2000
AIR CARRIER											
Enplanements (Millions)											
Domestic	278.2	415.5	414.2	431.4	447.8	695.8	5.1	(0.3)	4.2	3.8	4.4
International	24.1	29.4	34.3	36.6	38.2	65.1	4.5	16.7	6.7	4.4	5.5
System	302.3	444.9	448.5	468.0	486.0	760.9	5.1	0.8	4.4	3.9	4.5
RPM's (Billions)											
Domestic	203.2	322.1	325.5	339.5	352.9	565.0	6.1	1.1	4.3	4.0	4.7
International	54.2	76.0	90.5	97.6	102.5	185.4	6.6	19.1	7.9	5.0	6.2
System	257.4	398.1	416.0	437.1	455.4	750.4	6.2	4.5	5.1	4.2	5.0
COMMUTERS/REGIONALS*											
Enplanements (Millions)	12.9	28.0	30.5	32.9	35.4	65.6	11.4	8.9	7.9	7.6	6.6
RPM's (Billions)	1.6	4.4	4.8	5.3	5.8	12.3	14.7	9.1	10.4	9.4	8.7
FLEET											
Air Carrier	2,394	3,401	3,542	3,886	4,073	4,791	5.0	4.2	9.7	4.8	2.6
Commuter	1,413	1,604	1,684	1,737	1,771	2,136	2.2	5.0	3.2	2.0	2.0
General Aviation (000)	210.3	220.0	217.2	217.1	216.7	221.1	0.5	(1.3)	(0.1)	(0.2)	0.2
HOURS FLOWN (Millions)											
Air Carrier	6.5	9.4	9.7	10.2	10.6	13.4	5.6	3.2	5.2	3.9	2.7
General Aviation	41.9	33.7	33.6	34.0	34.4	38.6	(2.8)	(0.2)	1.2	1.2	1.2

Source: 1980-88 RSPA, FAA DATA
1989-2000 FAA Forecast

* Data for Altair, Empire, and Air Wisconsin removed from historical series for comparative purposes

Nationally, commuter/air taxi aircraft operations are expected to continue to increase at a faster rate than the other user categories--but not at the rates of the last several years. While replacement service in markets abandoned by the larger commercial air carriers may continue to offer some residual potential for growth, increased internal industry competition, spurred on and/or augmented by the development of new hubs with regional feeds through regional/commuter code-sharing agreements, will be the primary source of future growth.

Increased business use of general aviation is reflected in the changing character of the fleet. The more expensive and sophisticated turbine-powered part of the fixed-wing fleet is expected to grow much faster than the piston aircraft portion between 1988-2000. In 1988, there were 9,700 turbine-powered aircraft in the fixed-wing general aviation fleet, and this represented 4.8 percent of the total fixed-wing fleet. By the year 2000, it is projected that there will be 15,600 turbine-powered aircraft--7.8 percent of the total fixed-wing fleet. Similarly, in the helicopter fleet in 1988 there were 3,500 turbine-powered aircraft, which represented 55.6 percent of the total fleet. By the year 2000, it is projected that there will be 8,000 turbine-powered aircraft--77.6 percent of the total helicopter fleet.

FAA WORKLOAD FORECASTS

The FAA forecasting process is a continuous and interactive one which involves the FAA Forecast Branch's interaction with various FAA Offices and Services, other government agencies, and aviation industry groups. In addition, the process involves the use of various economic and aviation data bases, the use of outputs of various econometric models and equations, and other analytical techniques. The FAA workload measures, summarized here, are the resultant forecasts of this process and are used annually by the agency for manpower and facility planning.

Aviation activity at FAA facilities is expected to continue the growth pattern that began in 1983. The demand for FAA operational services is anticipated to increase over the forecast period as a result of continued strong growth in aviation activity. Total aircraft operations at FAA towered airports are forecast to increase to 80.2 million in the year 2000, a 2.3 percent annual growth rate over the 61.2 million operations achieved in 1988.

The increased use of avionics by regionals/commuters and general aviation and the implementation of additional Airport Radar Service Areas will contribute to instrument operations at FAA towered airports growing faster than total aircraft operations. Instrument operations are forecast to increase from 44.2 million in 1988 to 61.0 million in the year 2000, a 2.7 percent annual growth rate.

FAA WORKLOAD MEASURES
FISCAL YEARS 1989 - 2000

WORKLOAD MEASURES	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
(IN MILLIONS)	1980	1987	1988	1989	1990	2000	80-88	87-88	88-89	89-90	88-2000
Aircraft Operations											
Air Carrier	10.1	13.1	12.7	13.2	13.6	17.1	2.9	(3.1)	3.9	3.0	2.5
Air Taxi & Commuter	4.6	7.3	8.3	8.8	9.2	12.6	7.6	13.7	6.0	4.6	3.5
General Aviation	49.0	37.8	37.4	37.9	38.4	47.7	(3.4)	(1.6)	1.3	1.3	2.1
Military	2.5	2.7	2.8	2.8	2.8	2.8	1.4	3.7	0.0	0.0	0.0
TOTAL	66.2	61.0	61.2	62.7	64.0	80.2	(1.0)	0.3	2.5	2.1	2.3
Instrument Operations											
Air Carrier	10.6	13.7	13.4	13.9	14.4	18.2	3.0	(2.2)	3.7	3.6	2.6
Air Taxi & Commuter	4.1	7.3	8.4	8.9	9.3	12.7	9.4	15.1	6.0	4.5	3.5
General Aviation	19.3	17.9	18.1	18.7	19.7	25.8	(0.8)	1.1	3.3	5.4	3.0
Military	4.1	4.4	4.3	4.3	4.3	4.3	0.6	(2.3)	0.0	0.0	0.0
TOTAL	38.2	43.4	44.2	45.8	47.7	61.0	1.8	1.8	3.6	4.2	2.7
IFR Aircraft Handled											
Air Carrier	13.9	17.1	17.8	18.4	18.9	23.8	3.1	3.9	3.4	2.7	2.5
Air Taxi & Commuter	2.6	5.3	5.8	6.1	6.4	9.0	10.6	9.4	5.2	4.9	3.7
General Aviation	8.9	8.1	8.0	8.1	8.3	10.4	(1.3)	(1.2)	1.3	2.5	2.2
Military	4.7	5.3	4.6	4.6	4.6	4.6	(0.3)	(13.2)	0.0	0.0	0.0
TOTAL	30.1	35.8	36.2	37.2	38.3	47.8	2.3	1.0	2.8	3.0	2.3
Flight Services											
Pilot Briefs	18.3	12.8	11.6	11.3	11.2	11.8	(5.9)	(9.4)	(2.6)	(0.1)	0.2
Flight Plans Originated	9.0	7.6	7.5	7.6	7.8	9.2	(2.3)	(1.3)	1.3	2.6	1.7
Aircraft Contacted	9.6	7.0	6.4	6.2	6.2	6.2	(5.2)	(8.6)	(3.1)	N.C.	(0.2)
TOTAL	64.2	47.7	44.7	44.0	44.2	48.2	(4.7)	(6.3)	(1.6)	0.5	0.6

Source: FY 1980-88 FAA Data

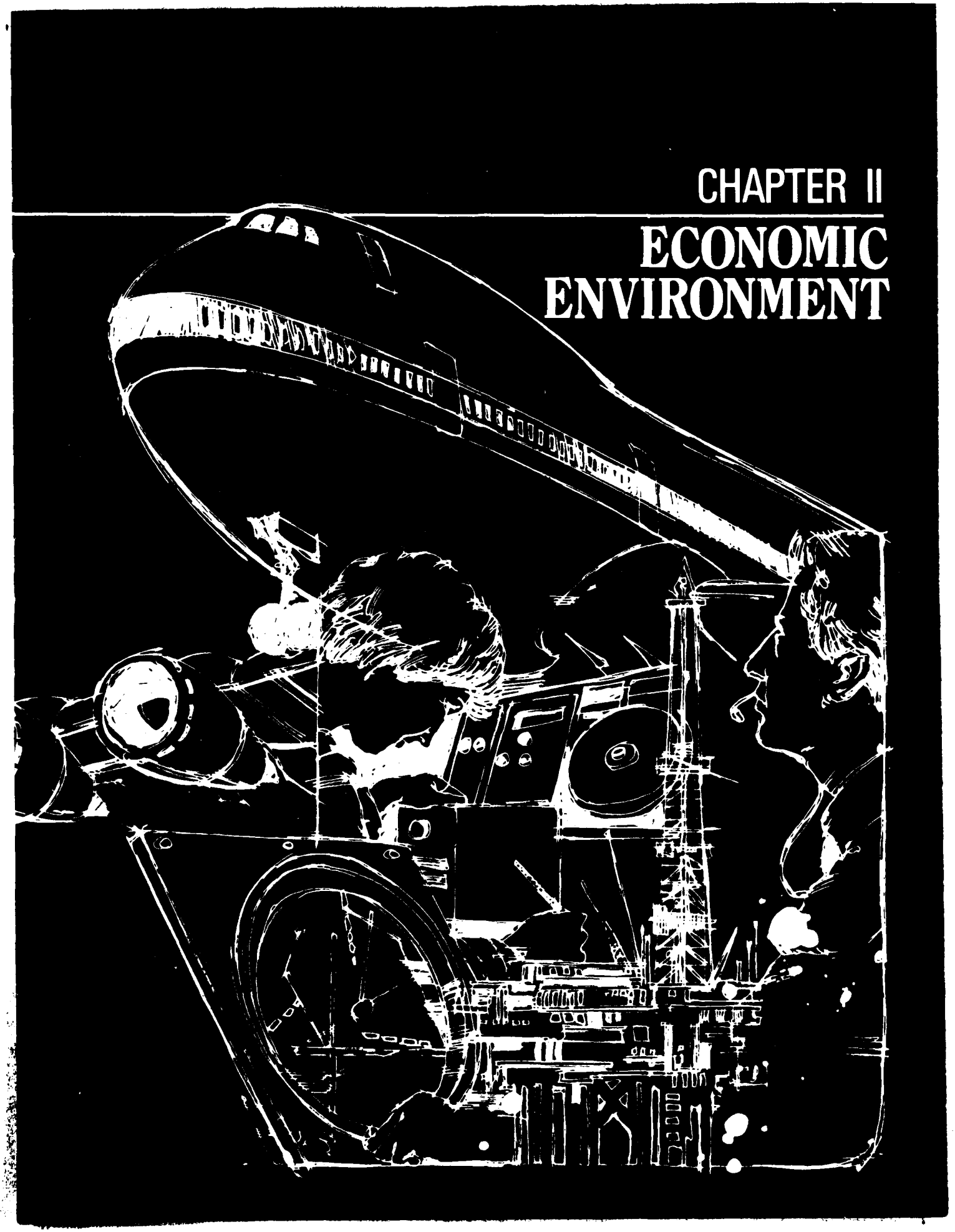
FY 1989-2000 FAA Forecasts

The workload at the Air Route Traffic Control Centers is forecast to increase at a 2.3 percent average annual rate between 1988-2000. The increased demand will come primarily from commercial air carriers and regionals/commuters. The number of regional/commuter aircraft handled at the Centers is projected to increase 55.2 percent during the next 12 years.

In summary, aviation activity is expected to continue to grow at about the same rate as the general economy. Aviation will continue to dominate all other transportation modes in the commercial intercity passenger market. Regional/commuter aircraft activity and the business use of general aviation are expected to experience greater growth than the larger, established airlines and personal use of general aviation.

CHAPTER II

ECONOMIC ENVIRONMENT



CHAPTER II
ECONOMIC ENVIRONMENT

REVIEW OF 1988

UNITED STATES

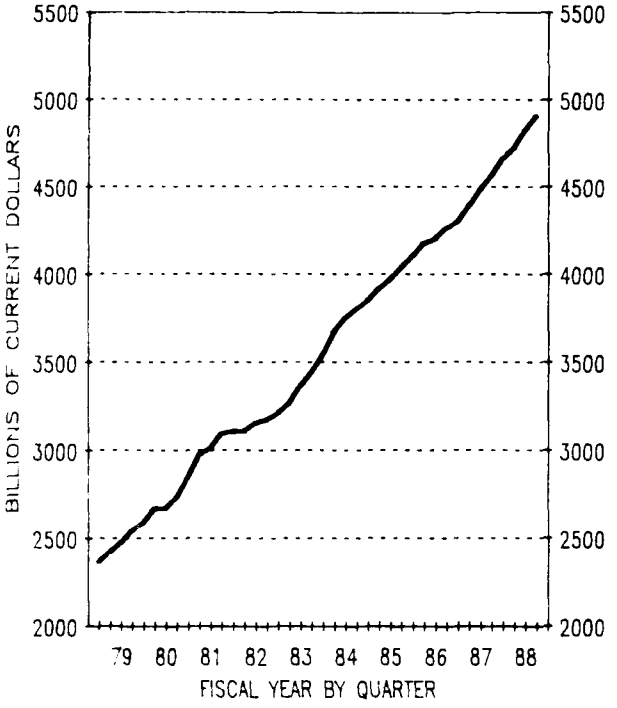
The current economic expansion began in 1983. It is comparable to some of the most robust recoveries of the postwar period, characterized by a favorable mix of rising output, declining inflation, and falling energy prices. In fiscal year 1988, the fifth full year of expansion, gross national product (GNP) rose $343 billion (or 7.7 percent). Gross national product adjusted for price changes rose 4.4 percent. Consumer prices continue to increase at relatively low rates, indicating that inflation is well under control. The consumer price index for all urban consumers rose only 4.1 percent. Increasing supplies of oil, accompanied by reduced demand due to conservation and the development of alternative sources of energy, continue to exert downward pressure on fuel prices. The oil and gas deflator declined 8.0 percent in fiscal year 1987 and increased 1.3 percent in fiscal year 1988.

The Federal Reserve Board (FRB) had taken action to slow growth in 1987. There was a major decline in the stock market on October 19, 1987. Since the decline, the FRB has worked to limit stock market price change impacts on the banking system, which continues to function effectively and to bolster the economy. The Dow Jones Industrials index was 2412.7 on October 16, 1987, the close the week before the major decline. By October 23, 1987, the index had declined 23.5 percent to 1846.8. By December 28, 1988, the index had recovered to 2166.6. Although the index has regained a substantial amount, the market has remained volatile. Many investors have still not returned to the stock market. Money that would have been invested in the stock market is now in savings accounts, bonds, and other less risky investments.

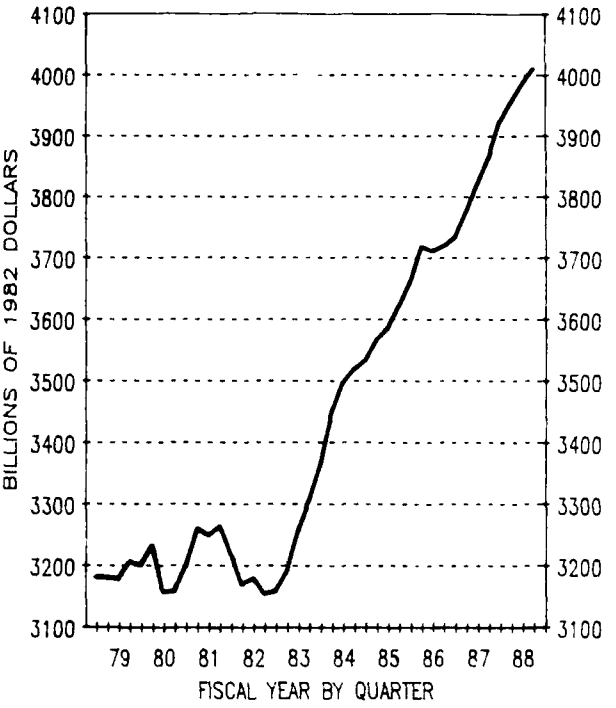
Economic growth is expected to continue through 1989. Gramm-Rudman-Hollings deficit reduction and associated Federal spending constraints and tax increases could reduce projected general economic growth. Inflation is expected to remain moderate as fuel prices decline. Declining fuel prices, low inflation rates, and an expanding economy will all contribute to a continuation of the upturn in aviation activity begun in 1983.

U. S. ECONOMIC TRENDS

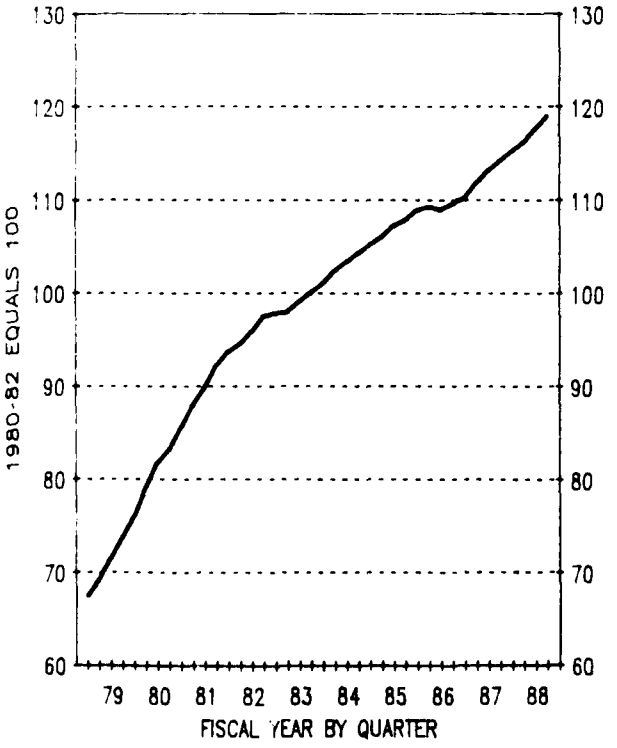
NOMINAL GNP



'REAL' GNP



CONSUMER PRICE INDEX



OIL AND GAS DEFLATOR

During 1988 there was a continuing decline of the U.S. dollar relative to other world currencies. The U.S. dollar effective exchange rate declined 6.0 percent in 1988. The decline of the dollar is expected to affect both international trade and domestic markets. It will be easier for U.S. firms, including the U.S. aircraft and engine industry, to capture export markets. Another consequence is that U.S. consumers will pay higher prices for imports. This should stimulate demand for domestic products and overall economic activity. Foreign travel will be more expensive because of increased lodging and meal costs, but U.S. carriers will gain a relative airfare advantage over foreign carriers.

WORLD

The combined gross domestic product for Europe and Africa, adjusted for price changes, grew 3.1 percent in 1988. The combined gross domestic product for Latin America (including Mexico), adjusted for price changes, was unchanged in 1988. The combined gross domestic product for Japan, Australia, New Zealand, the Pacific Basin, and other Asian countries, adjusted for price changes, grew 5.2 percent in 1988.

Consumer price inflation in West Germany increased by 1.0 percent in 1988. Consumer price inflation in the United Kingdom was higher, increasing by 5.5 percent in 1988. Inflation in Japan was low, with prices increasing by 2.0 percent in 1988.

The exchange rate between the Japanese yen and the U.S. dollar remained very weak, decreasing by 11.1 percent in 1988. The exchange rate between the West German deutsche mark and the U.S. dollar remained weak, decreasing by 2.3 percent in 1988.

ECONOMIC FORECASTS

The economic scenario utilized in developing the FAA Baseline Aviation Forecasts for the period 1989-1994 was provided by the Executive Office of the President, Office of Management and Budget (OMB). For the period 1995-2000, the economic scenario utilized consensus growth rates of the economic variables prepared by Data Resources, Inc. (DRI), Evans Economics, Inc. (Evans), and The WEFA Group (WEFA). All of the indices presented here have a single base year, except for the Consumer Price Index; the Bureau of Labor Statistics has based the index on an average of the 1980 through 1982 time period (previously 1967). The data are presented in tabular form in Chapter X. However, the principal series used in preparing the forecasts are presented and discussed here. The U.S. effective exchange rate index and other international data were prepared by WEFA. Specific economic assumptions used in the individual aviation activity models are discussed in the following pages.

GROSS NATIONAL PRODUCT

United States

Gross national product, adjusted for price changes, is expected to grow at an annual rate of 2.7 percent throughout the forecast period. However, real gross national product increases by 3.0 percent in 1989, then increases 3.2 percent in 1990, and averages 3.2 percent between 1989 and 1994. Economic growth is expected to slow somewhat during the latter half of the forecast period, averaging only 2.2 percent from 1995 to the year 2000.

World

The combined gross domestic product for Europe and Africa, adjusted for price changes, is expected to grow at an annual rate of 2.6 percent throughout the forecast period. Real gross national product will increase by 2.3 percent in 1989, then by 2.5 percent in 1990. It will average 2.7 percent between 1989 and 1994. Economic growth is expected to slow somewhat during the latter half of the forecast period, averaging only 2.6 percent from 1994 to the year 2000.

The combined gross domestic product for Latin America (including Mexico), adjusted for price changes, is expected to grow at an annual rate of 3.2 percent throughout the forecast period. Real gross national product will increase by 1.4 percent in 1989, then 4.0 percent in 1990. It will average 4.2 percent between 1989 and 1994. Economic growth is expected to slow somewhat during the latter half of the forecast period, averaging only 3.2 percent from 1994 to the year 2000.

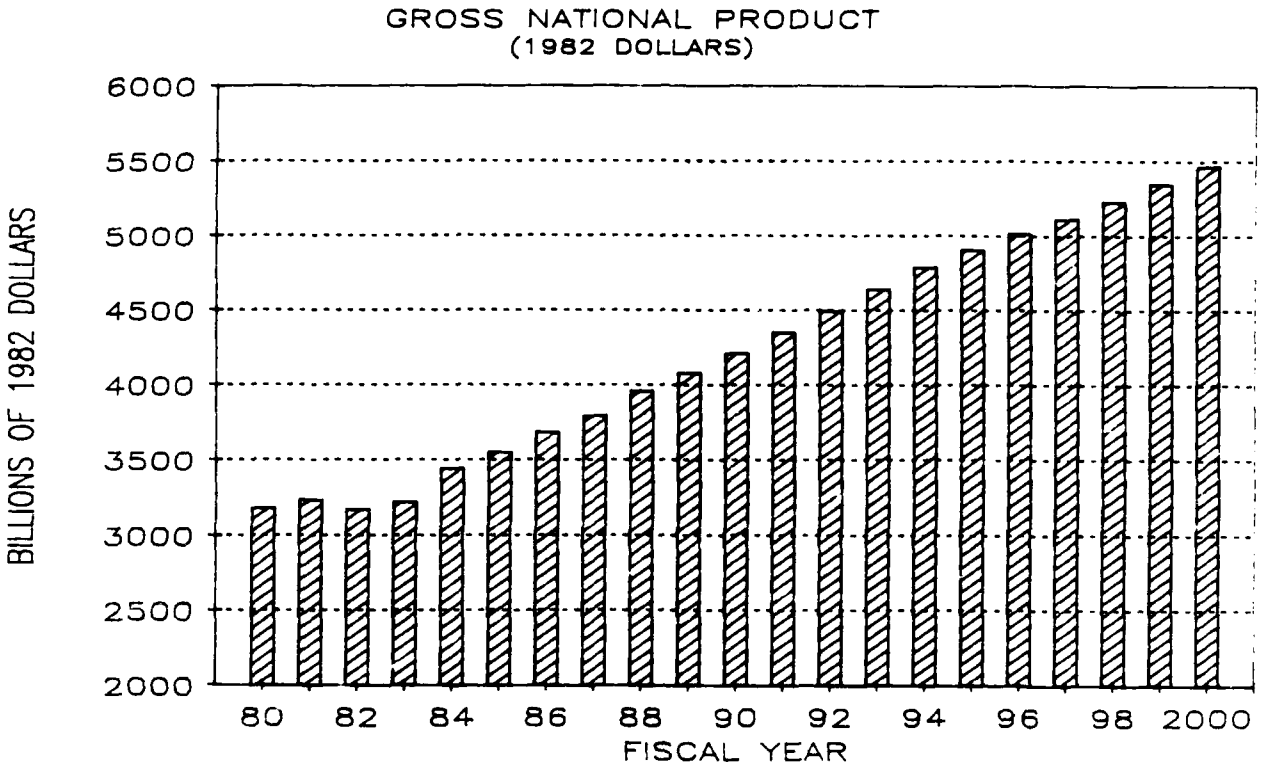
The combined gross domestic product for Japan, Australia, New Zealand, the Pacific Basin, and other Asian countries, adjusted for price changes, is expected to grow at an annual rate of 3.7 percent throughout the forecast period. Real gross national product will increase by 4.2 percent in 1989, then by 3.6 percent in 1990. It will average 3.8 percent between 1989 and 1994. Economic growth is expected to slow somewhat during the latter half of the forecast period, averaging only 3.7 percent from 1994 to the year 2000.

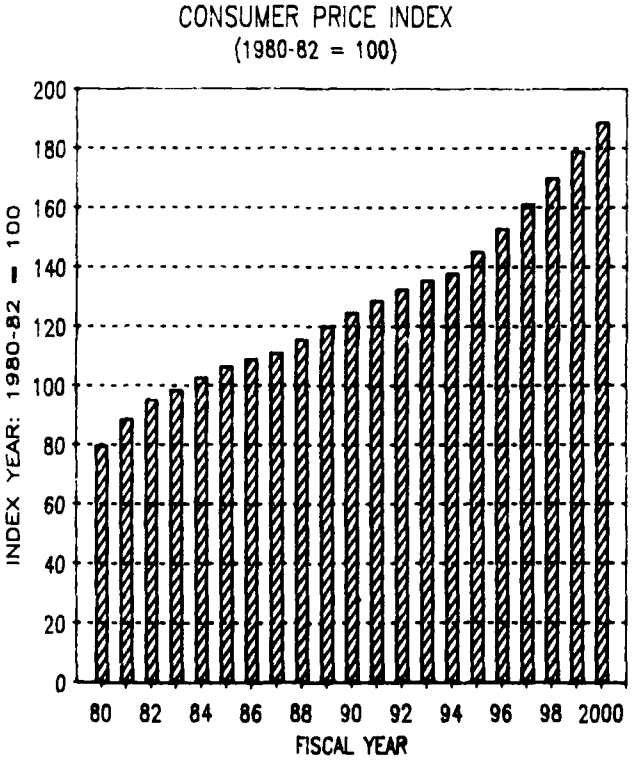
CONSUMER PRICE INDEX

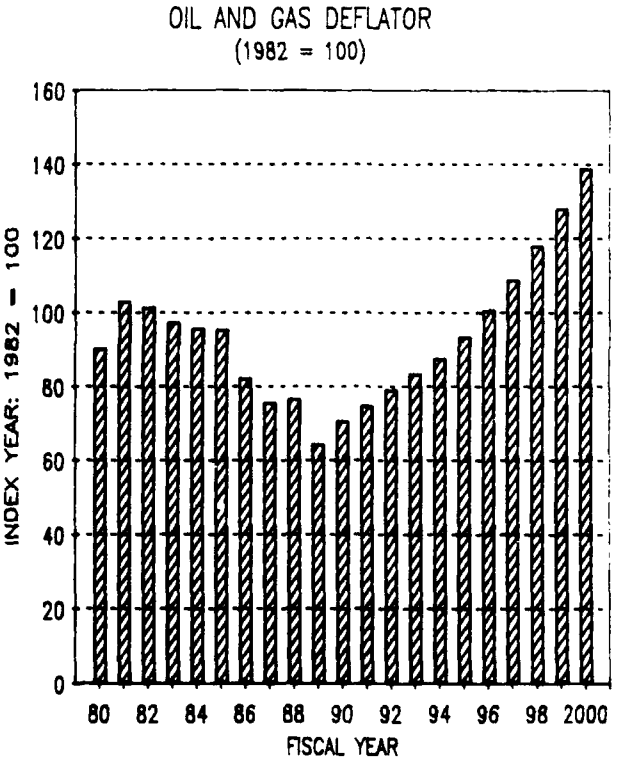
United States

Consumer prices are expected to remain in the moderate range, increasing at an average annual rate of 4.1 percent over the forecast period. Inflation is forecast to increase by 4.0 percent in 1989 and 3.8 percent in 1990, and settle at an annual average rate of 3.0 percent over the first 6 years of the forecast period. Inflation is expected to increase to an annual rate of 5.3 percent over the latter half of the forecast period.

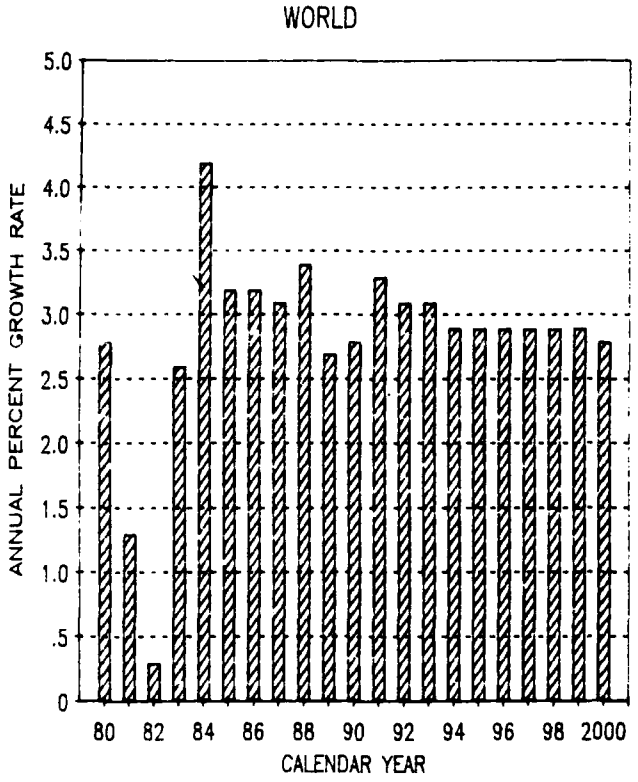
FORECASTS OF U.S. ECONOMIC VARIABLES

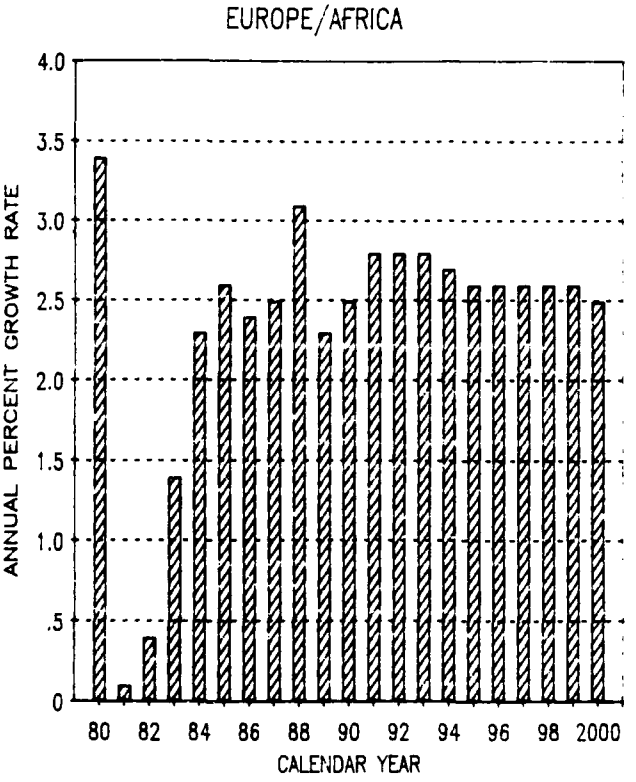


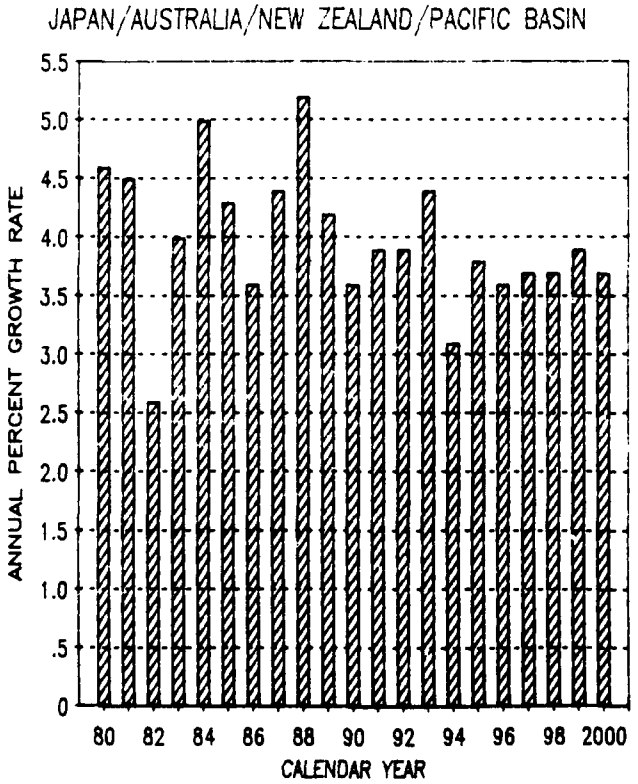


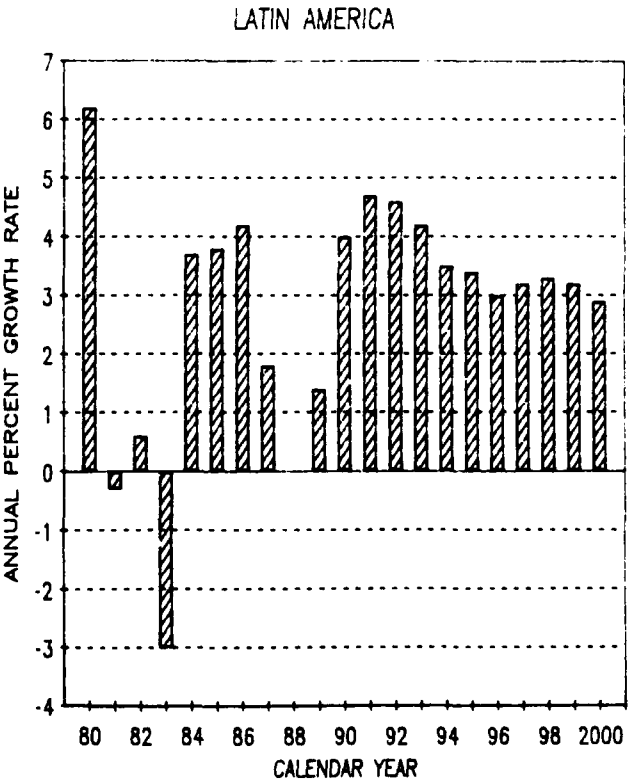


WORLD GDP TRENDS AND FORECASTS









World

Consumer price inflation in West Germany is expected to remain low, increasing at an average annual rate of 2.1 percent over the forecast period. Inflation is forecast to increase by 1.2 percent in 1989 and 1.5 percent in 1990, and settle at an average 1.8 percent over the first 6 years of the forecast period. Inflation is expected to increase to an annual rate of 2.4 percent over the latter half of the forecast period.

Consumer price inflation in the United Kingdom is expected to remain moderate, increasing by an average annual rate of 4.5 percent over the forecast period. Inflation is forecast to increase by 6.4 percent in 1989 and 6.4 percent in 1990, and settle at an average 5.2 percent over the first 6 years of the forecast period. Inflation is expected to moderate to an annual rate of 3.8 percent over the latter half of the forecast period.

Consumer price inflation in Japan is expected to remain low, increasing by an average annual rate of 1.7 percent over the forecast period. Inflation is forecast to increase by 1.6 percent in 1989 and 0.8 percent in 1990, and settle at an average 1.6 percent over the first 6 years of the forecast period. Inflation is expected to increase to an annual rate of 1.8 percent over the latter half of the forecast period.

OIL AND GAS DEFLATOR

United States

Over the entire forecast period, nominal fuel prices are predicted to increase at an annual rate of 5.1 percent, and real fuel prices (1982 dollars) are expected to increase by approximately 1.0 percent a year. Fuel prices are forecast to decline by 16.1 percent in 1989, and increase by 9.9 percent in 1990. Over the first 6 years of the forecast period, nominal fuel prices are forecast to increase at an annual rate of 2.2 percent, while real fuel prices are forecast to decline at an annual rate of 0.8 percent a year. Fuel prices are expected to increase over the 1995 to the year 2000 time period. During this time period, nominal fuel prices will increase at an annual rate of 8.0 percent, while real fuel prices will increase at a yearly rate of 2.7 percent.

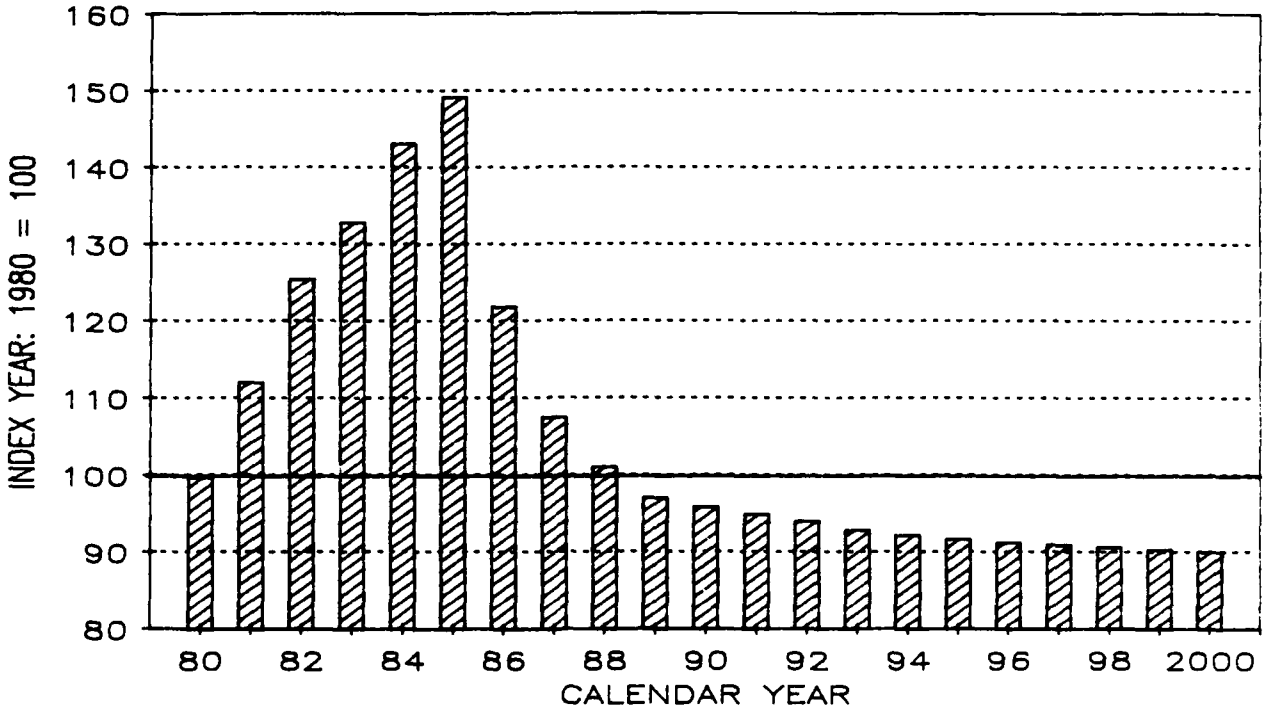
DOLLAR EXCHANGE RATE

United States

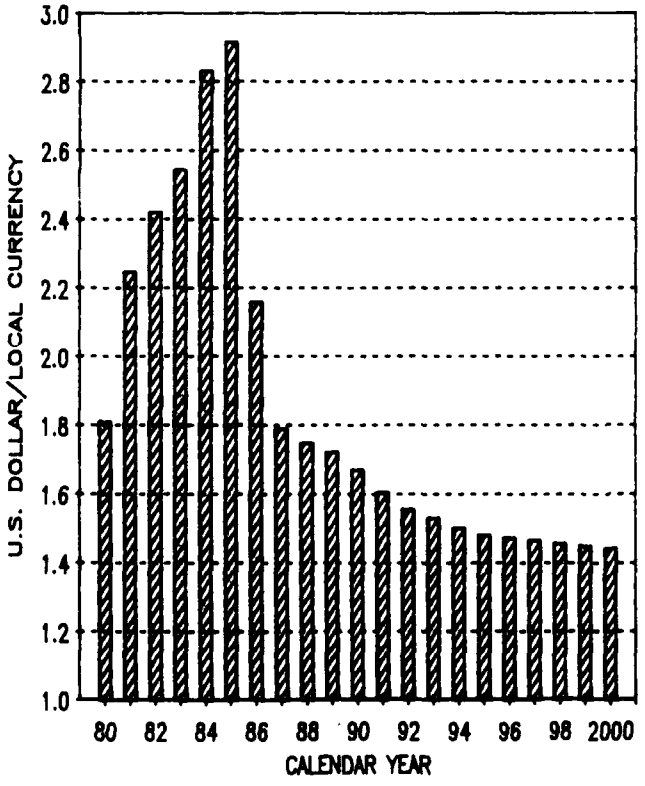
The calendar year forecast of the U.S. dollar effective exchange rate is for a continuing decline of 4.0 percent in 1989; for declines of 1.2 percent in 1990 and 1.0 percent in 1991; and for declines of 0.9 percent in 1992 and 1.3 percent in 1993. The rate of decline for the whole forecast period is 1.0 percent. The decline over the whole period will reduce imports, and foreign purchases, such as foreign travel, will be more expensive.

EXCHANGE RATE TRENDS AND FORECASTS

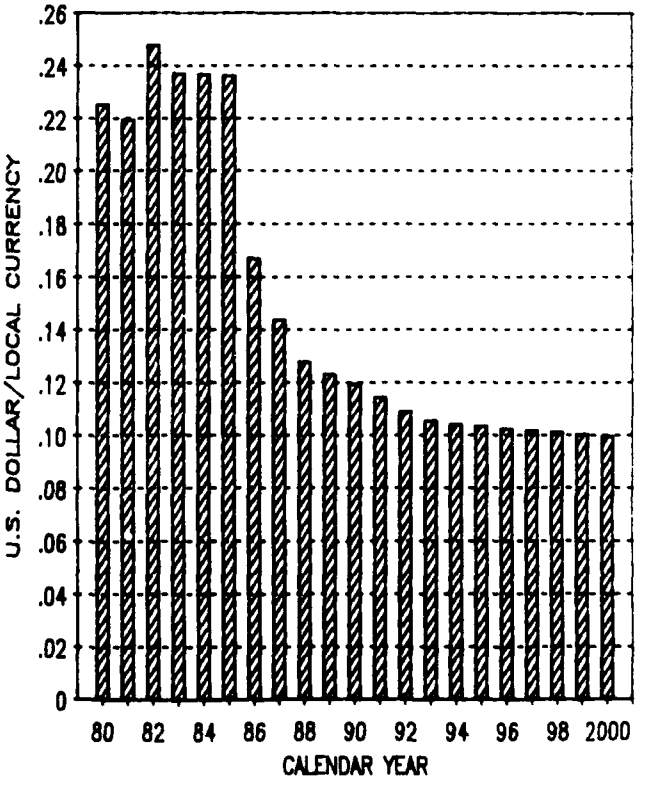
U.S. EFFECTIVE EXCHANGE RATE



WEST GERMAN MARK



JAPANESE YEN



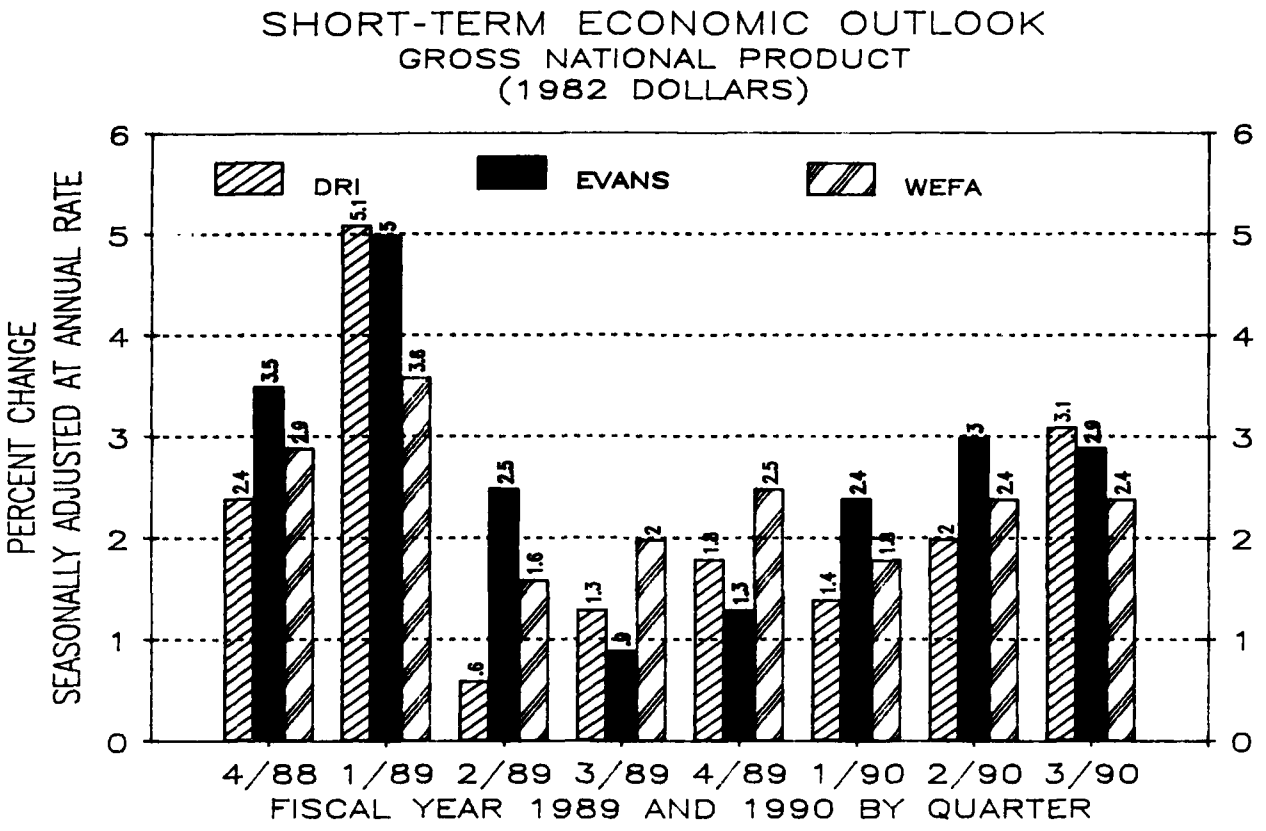
World

The exchange rate between the U.S. dollar and West German deutsche mark is expected to remain weak, declining at an average annual rate of 1.6 percent over the forecast period. The exchange rate is forecast to decrease by 1.5 percent in 1989 and decrease by 2.9 percent in 1990, and settle at an average decline of 2.5 percent over the first 6 years of the forecast period. The exchange rate is expected to decrease at an annual rate of 0.7 percent over the latter half of the forecast period.

The exchange rate between the U.S. dollar and Japanese yen is also expected to remain weak, decreasing by an average annual rate of 2.1 percent over the forecast period. The exchange rate is forecast to decrease by 3.7 percent in 1989 and 2.8 percent in 1990, and settle at an average decline of 2.1 percent over the first 6 years of the forecast period. The exchange rate is expected to decrease at an annual rate of 0.7 percent over the latter half of the forecast period.

THE UNCERTAIN SHORT-TERM ECONOMIC OUTLOOK

An economic downturn has been a possibility for several years but has not materialized. The stock market and related markets have still not fully recovered from the October 1987 decline. This creates a potential source of economic weakness. Although the OMB is forecasting GNP growth of 3.0 percent in fiscal year 1989 and 3.2 percent in fiscal year 1990, WEFA is forecasting slowdowns with GNP growth of 1.9 percent in fiscal year 1990. DRI is projecting a slowdown in fiscal year 1990 with 1.8 percent growth, and Evans is projecting slowdowns in fiscal year 1991 with 1.9 percent growth and 1996, 1997, and 1998 with 1.7 percent, 1.4 percent and 1.9 percent growth, respectively. The U.S. economy has benefited from the decline in world energy prices, but a rebound in energy prices would lower economic growth and increase aviation costs. OMB has forecast the oil and gas deflator to decline 16.0 percent in fiscal year 1989, while the consensus is for a 4.0 percent increase. The consensus forecast is for significantly higher price increases over the last 6 years of the forecast period than the consensus forecast of last year. The projected slide of the dollar has predictable benefits and costs to the economy. Budget and tax policy are also important to the economy, and the outcome of new administration negotiations with Congress, particularly the policy of no tax increases is uncertain.

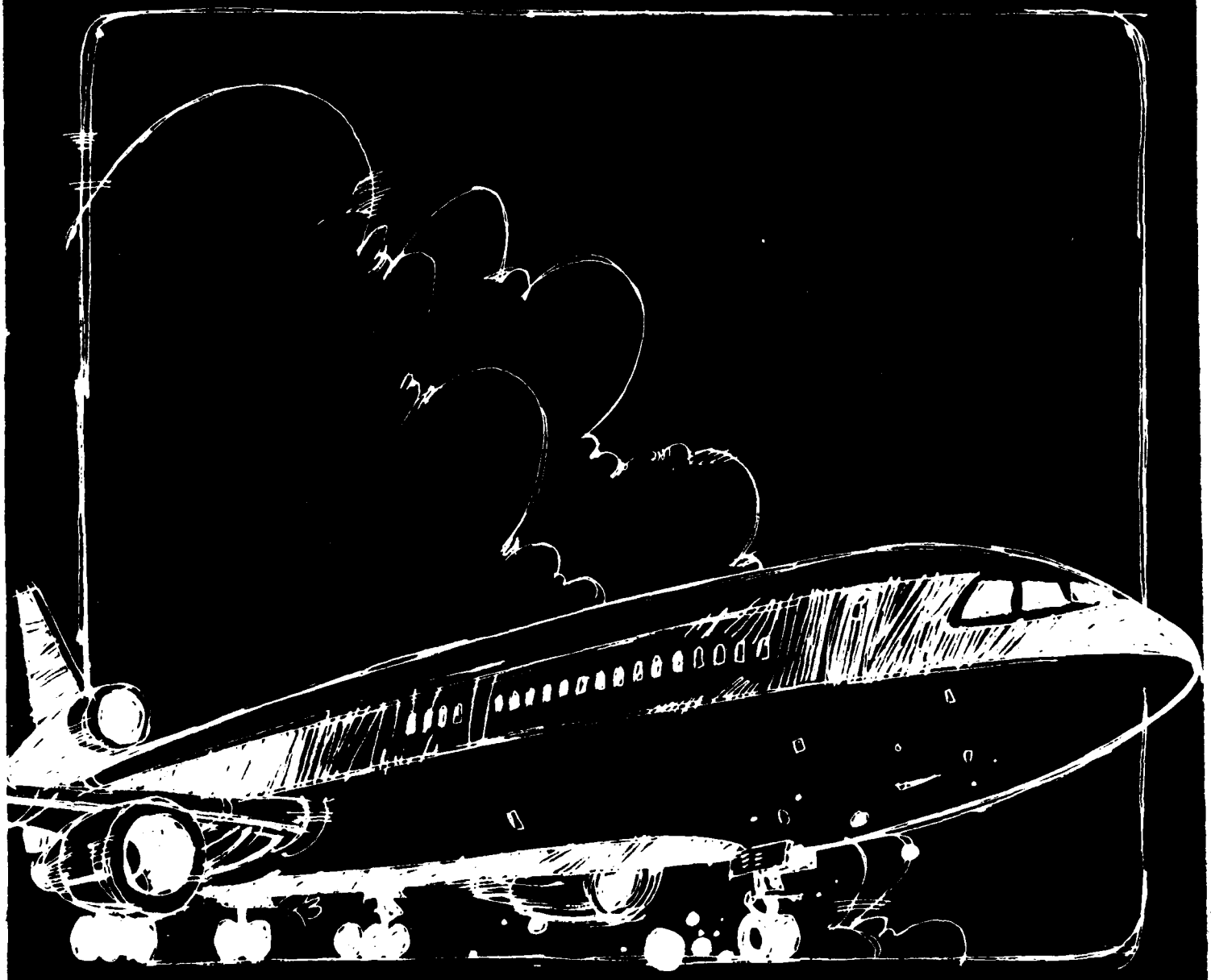


As discussed last year, the short-term forecast of the three forecasting services for fiscal year 1989 and 1990 are different from each other and from the OMB forecast. But this year no one is forecasting a recession. DRI (1/89) has four slow growth quarters. (Defined as real GNP growth rate less than 2.0 percent.) Evans (12/88) and WEFA (12/88) each have only 2 slow growth quarters. DRI is forecasting GNP growth of 0.6 percent 1.3 percent in the third and fourth quarters fiscal year 1989, while Evans is predicting 2.5 and 0.9 percent, and WEFA 1.6 percent and 2.0 percent. DRI is forecasting GNP growth of 1.8 percent 1.4 percent in the first and second quarter of fiscal year 1990, while Evans is predicting 1.3 and 2.4 percent, and WEFA 2.5 percent and 1.8 percent.

OMB is predicting yearly growth rates in GNP of 3.0 percent for fiscal year 1989, increasing to to 3.2 percent for fiscal year 1990. In contrast our services predict lower rates for both fiscal years: DRI is predicting 2.7 percent and 1.8 percent, Evans is predicting 3.2 percent and 2.1 percent, and WEFA is predicting 2.8 percent and 2.2 percent for fiscal years 1989 and 1990, respectively.

CHAPTER III

COMMERCIAL AIR CARRIERS



CHAPTER III
COMMERCIAL AIR CARRIERS

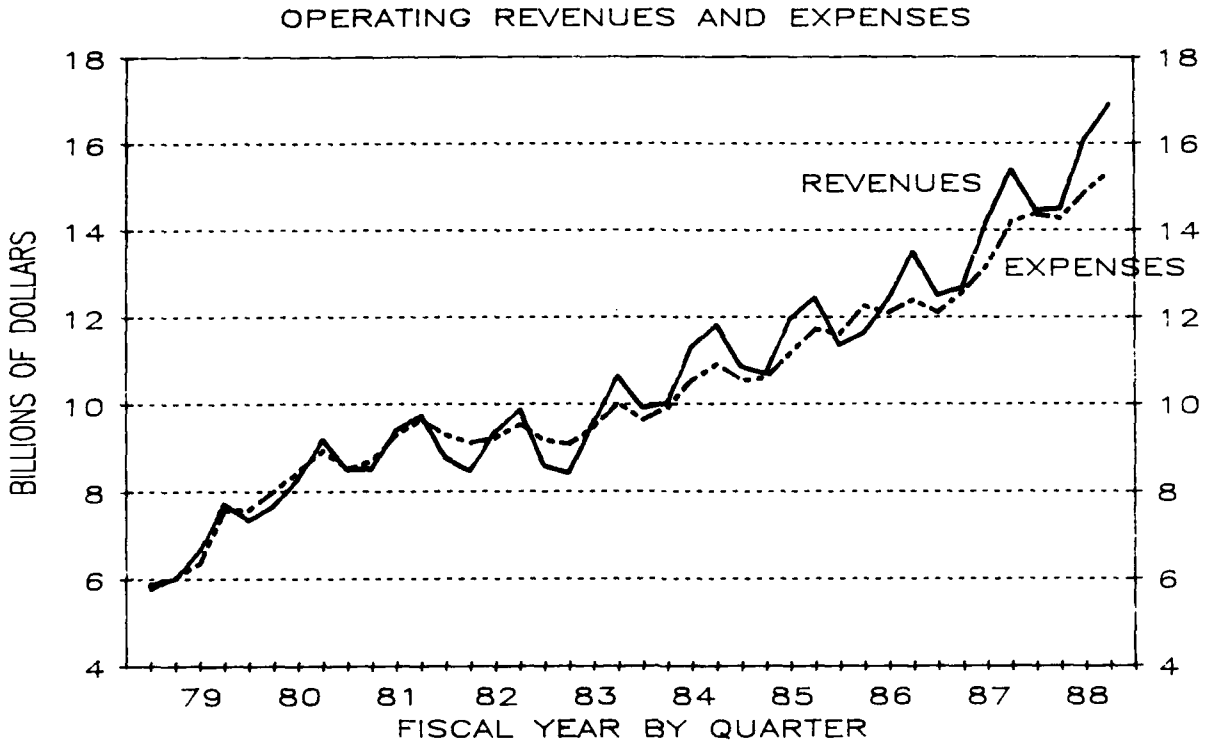
At the end of fiscal year 1988, there were approximately 61 large U.S. commercial passenger and cargo airlines (operating aircraft with over 60 seats) reporting traffic and financial data to the Research and Special Programs Administration (RSPA), Department of Transportation (DOT), on Form 41. Thirty-five of these carriers provide scheduled passenger service and form the data base for these air carrier forecasts. A list of active and inactive commercial passenger and cargo air carriers may be found in Appendices A and B.

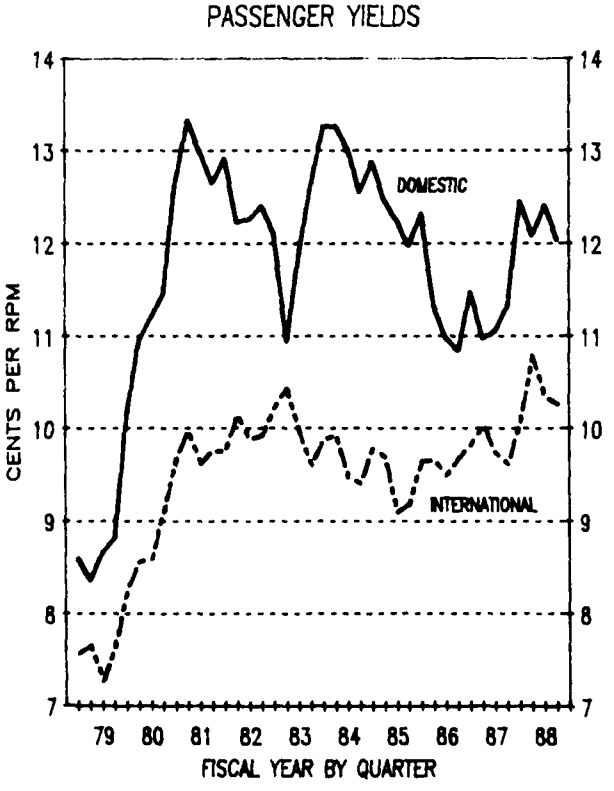
REVIEW OF 1988

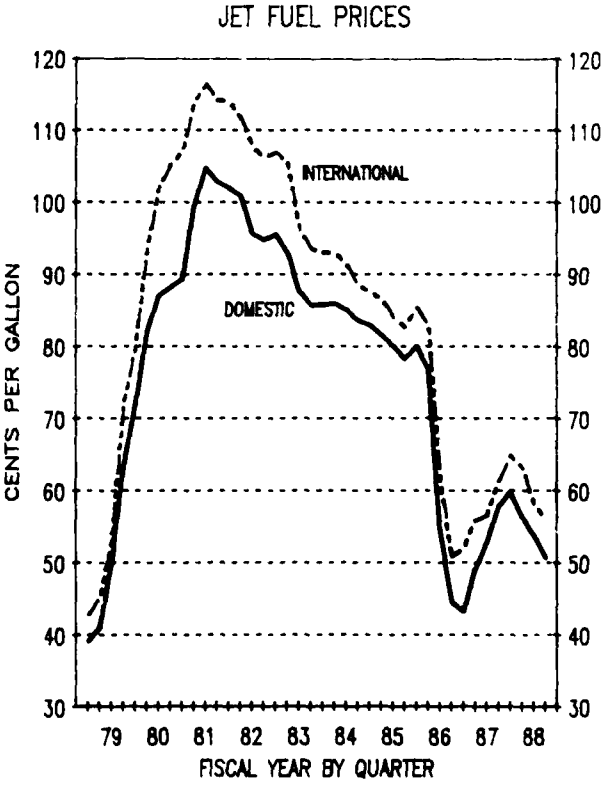
FINANCIAL RESULTS

Financially, fiscal year 1988 was a banner year for U.S. commercial airlines. The industry reported a record operating profit of $3.1 billion, surpassing the previous high of $2.7 billion earned in fiscal year 1987. In fact, 1988 marked the fifth consecutive profitable year for U.S. commercial airlines, a period during which industry operating profits totaled almost $10.4 billion. A number of factors were responsible for the financial success in 1988. First, despite a slowdown in the demand for domestic travel (RPM's increased 1.1 percent), domestic passenger yields increased by 9.2 percent, accounting for nearly all the growth in domestic operating revenues (up 10.0 percent). Second, strong demand for international travel (RPM's increased 19.1 percent), combined with a 5.6 percent increase in international yields, led to spectacular gains in international revenues (up 23.9 percent). Third, a 15.1 percent decline in the price of jet fuel since the end of fiscal year 1987 helped to moderate the increase in overall operating expenses.

U.S. AIR CARRIER REVENUE AND COST TRENDS







U.S. airlines posted a net profit of $1.1 billion in fiscal year 1988, also a record high for the industry. This represents a considerable improvement over the net profit of $723 million in 1987. Over the past 5 years, however, the industry has earned net profits totaling only $3.3 billion, $7.1 billion less than the operating profits posted during the same period. Much of the difference between the industry's operating and net profit performance can be attributed directly to the interest that must be paid, in good times or in bad, on the industry's considerable long-term debt. At the end of fiscal year 1988, the industry's long-term debt stood at just over $12 billion.

In fiscal year 1988, it cost U.S. commercial air carriers almost $1.9 billion to service the interest on the long-term debt. Over the past 5 years interest payments on the industry's long-term debt have totaled over $8.3 billion, $1.2 billion more than the gap between the industry's operating profit and net profit levels over this time period. The industry's strong traffic growth over the previous 4 years (up 39.9 percent) has masked this problem somewhat, but it is clear that a significant downturn in overall traffic demand could have disastrous results for some of the more heavily leveraged airlines.

While the financial results of most U.S. commercial airlines improved significantly in fiscal year 1988, there is still considerable disparity among the financial results of individual carriers. In 1988, air carrier financial results ranged from American Airlines operating profit of $695.1 million to Eastern's operating loss of $210.2 million. At the profit end of the scale, eight carriers reported operating profits totaling almost $3.0 billion. At the bottom end of the scale, 15 carriers reported operating losses totaling $488.2 million. Moreover, two carriers accounted for over $389.3 million (79.7 percent) of these operating losses. At the net level, United Airlines led all airlines with a net profit of $459.2 million, while the Texas Air Corporation (Continental/Eastern) posted the largest net loss, $672.2 million.

Declining jet fuel prices helped to ease the pressure on those air carriers with weak balance sheets in fiscal year 1988; however, there continues to be cause for concern. Although jet fuel costs are forecast to decline significantly in 1989, fuel prices are expected to rebound and to increase at relatively high rates over the latter half of the forecast period. Should the general economic conditions cause a short-term slowdown or an actual decline in passenger demand, it is possible that one or more of the financially weaker carriers will reduce fares to assure adequate cash flow. If this occurs, there may be further adverse affects on profits. While U.S. carriers appear to have a firm grasp on fares at the current time, a lengthy slowdown in demand could precipitate an industry-wide fare war. If such a scenario were to occur, there could be many losers and very few winners.

SCHEDULED PASSENGER TRAFFIC AND CAPACITY

Scheduled passenger traffic on U.S. commercial airlines increased for the seventh consecutive year in fiscal year 1988. Over this seven-year period (1982 to 1988), revenue passenger miles (RPM's) and enplanements increased by 67.5 and 56.9 percent (an average of 7.7 and 6.6 percent per year), respectively. In fiscal year 1988, revenue passenger miles (416.0 billion) increased by 4.5 percent and passenger enplanements (448.5 million) grew by only 0.8 percent. The growth in passenger demand in 1988 can best be described as sluggish, especially in light of the strong growth ('real' GNP up 4.4 percent) of the U.S. general economy.

Available seat miles (ASM's) totaled 668.6 billion in fiscal year 1988, an increase of 4.6 percent over 1987. Over the past 7 years, scheduled system ASM's have grown by 58.1 percent, an average of 6.8 percent per year. During this same period, the system load factor increased from 58.7 percent in 1981 to 62.3 percent in 1987, falling only slightly to 62.2 percent in 1988.

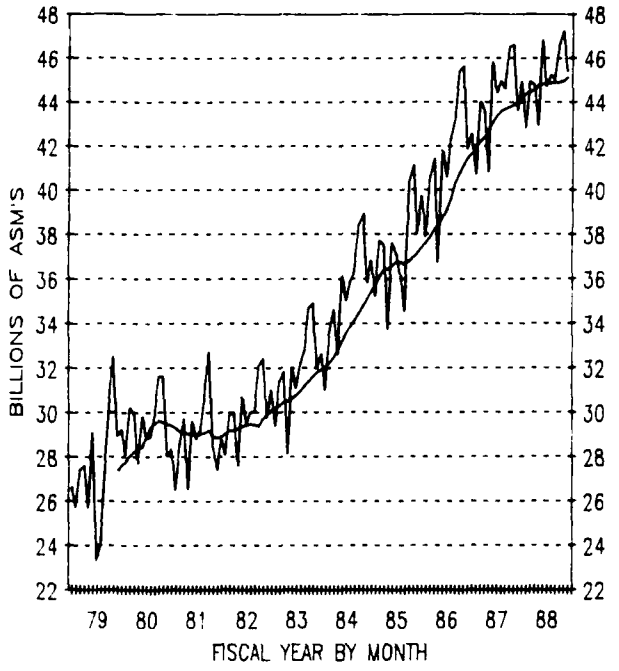
Domestic Passenger Traffic and Capacity

Following 3 consecutive years of strong traffic growth (up 35.5 percent between 1985 and 1987), the demand for air travel within the United States slowed in fiscal year 1988. Domestic RPM's (325.5 billion) grew by 1.1 percent and the number of passenger enplanements (414.2 million) actually declined by 0.3 percent in 1988, the first such decline since 1981. Higher fares are probably the main cause for the sluggish growth in passenger demand in 1988. Starting in June 1987, U.S. airlines instituted a series of fuel surcharges and across-the-board fare increases. These higher fare levels held throughout 1988 and, coupled with only moderate increases in domestic capacity, reduced the demand for domestic travel.

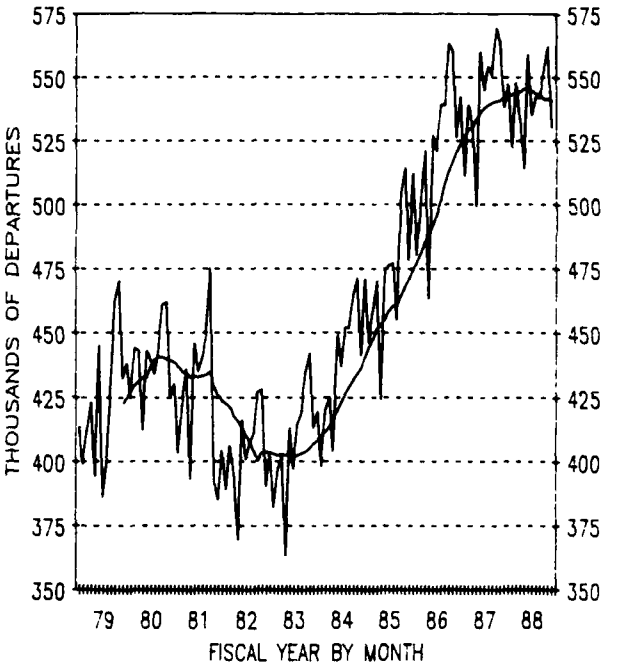
Domestic capacity, after increasing at an average annual rate of 8.7 percent between 1983 and 1987, grew only slightly faster than passenger demand in fiscal year 1988, up 2.2 percent to 533.3 billion ASM's. A decision by the Department of Transportation to publish, on a monthly basis, a ranking of U.S. airline on-time performance was probably one of the factors that impacted the growth of domestic capacity. To improve on-time schedule performance, airline management lengthened published travel times, thereby decreasing the effective utilization (average hours flown per aircraft per day) of its aircraft. Because of the slow growth in capacity, domestic load factors remained at historically high levels, averaging 61.0 percent in fiscal year 1988, only 0.7 points below the 1987 load factor.

U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
DOMESTIC OPERATIONS

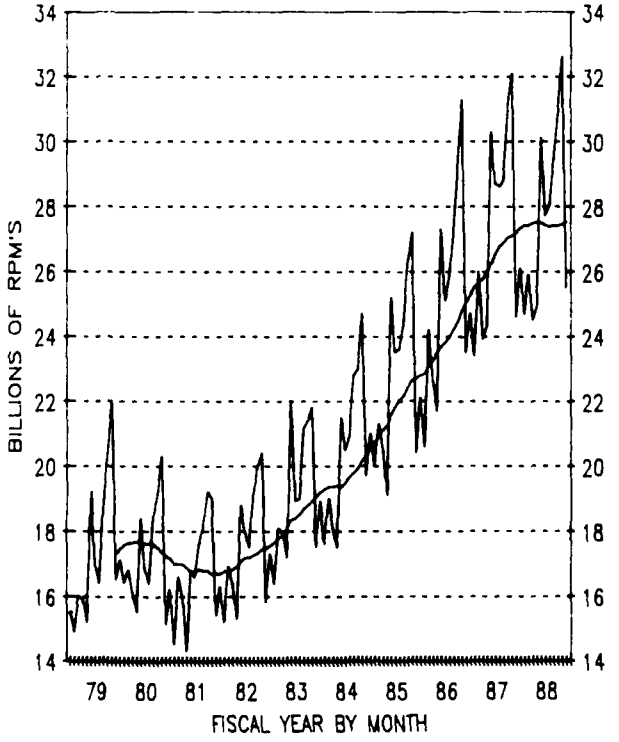
AVAILABLE SEAT MILES



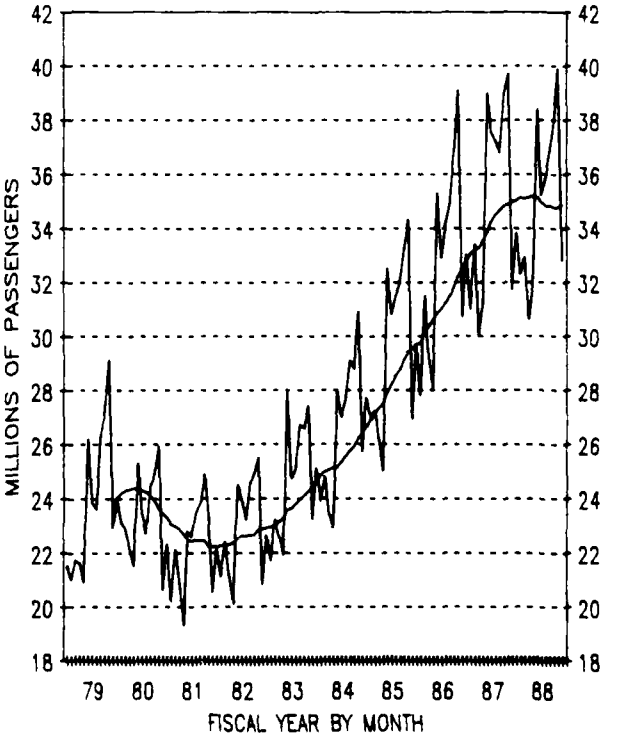
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



International Passenger Traffic and Capacity

After a disappointing traffic year in fiscal year 1986, largely due to terrorist activities abroad, international traffic demand has exceeded almost all expectations. Despite a continuing decline of the U.S. dollar relative to other foreign currencies (for example, the U.S. dollar was down 18.9 percent against the West German deutsche mark since 1986), international RPM's and passenger enplanements have increased by 41.6 and 40.0 percent, respectively, over the past 2 years. In fiscal year 1988, international RPM's (90.5 billion) were up 19.1 percent, and passenger enplanements (34.2 million) grew by 16.5 percent. A large part of this growth occurred during the first half of fiscal year 1988 (RPM's and enplanements up 24.5 and 20.7 percent, respectively); as travel to European destinations continued to rebound from the fear of terrorism. Although international travel slowed somewhat during the latter half of fiscal year 1988 (RPM's and enplanements up 15.7 and 13.4 percent, respectively), the growth was still considerably higher than even the most optimistic industry experts had predicted prior to the beginning of the year.

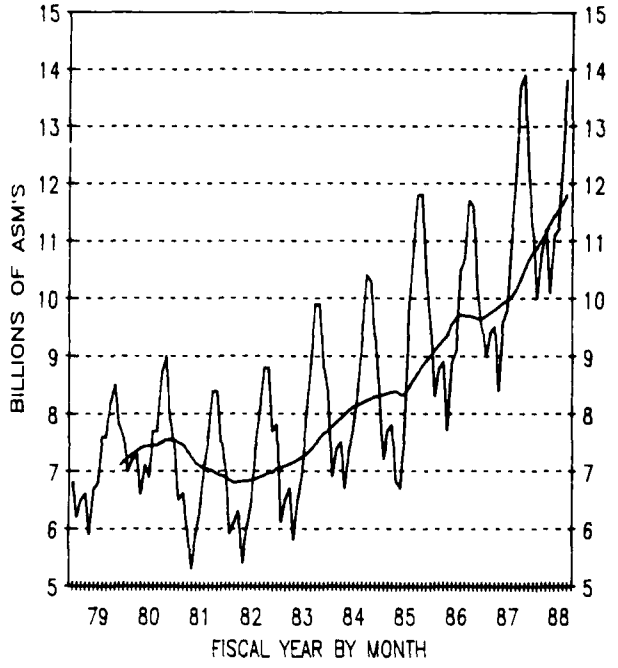
A large part of the growth in the demand for international travel may be attributable to the significant increase in international schedules during fiscal year 1988. International seat miles (135.4 billion) increased by 15.3 percent in 1988. However, international departures grew at a slightly faster pace (up 15.9 percent), reflecting the increased utilization of the smaller widebody twins (i.e., B-767 and A-310) on the transatlantic routes. This proved to be a successful scheduling strategy, as reflected by the 66.9 percent load factor on international service in fiscal year 1988. In fact, the 1988 load factor established a record, surpassing the previous record of 66.1 percent set in 1984.

Atlantic Routes

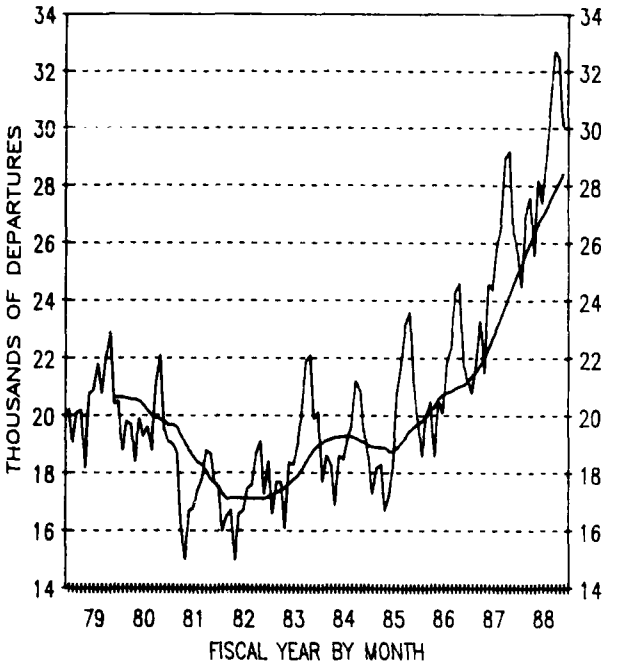
After registering RPM and enplanement increases in fiscal year 1987 of 18.1 and 17.9 percent, respectively, most industry experts assumed that the pent-up demand for European markets, curtailed by terrorist activities in 1986, had been satisfied. However, passenger demand for European and other North Atlantic destinations grew at an even faster pace in fiscal year 1988. Revenue passenger miles (46.1 billion) increased by 19.9 percent, and the number of passenger enplanements (14.6 million) increased by 17.7 percent. As might be expected, a large part of the growth in demand to European destinations occurred during the first part of the year (RPM's and enplanements up 31.8 and 28.8 percent, respectively), reflecting the recovery from the impact of terrorist activities during the spring and summer of 1986. However, the traffic results during the latter half of the year point to a still expanding market, with RPM's and enplanements growing by 13.7 and 11.3 percent, respectively.

U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS

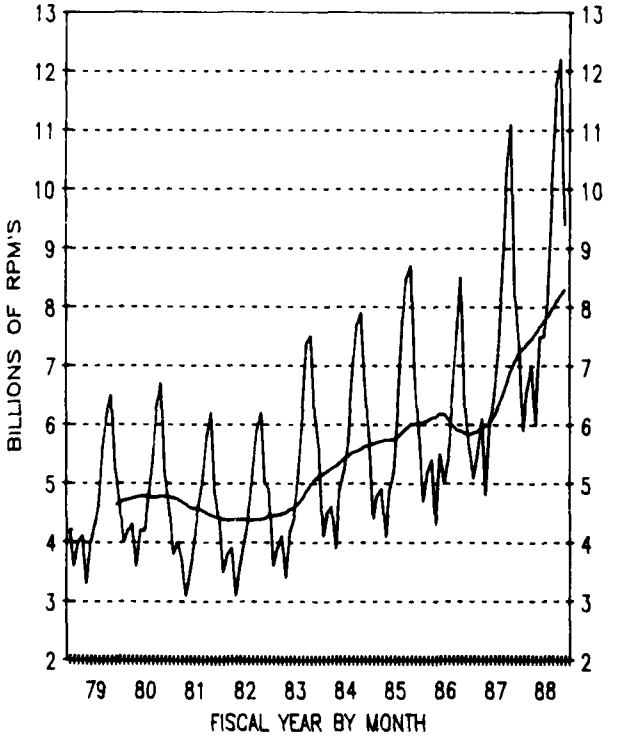
AVAILABLE SEAT MILES



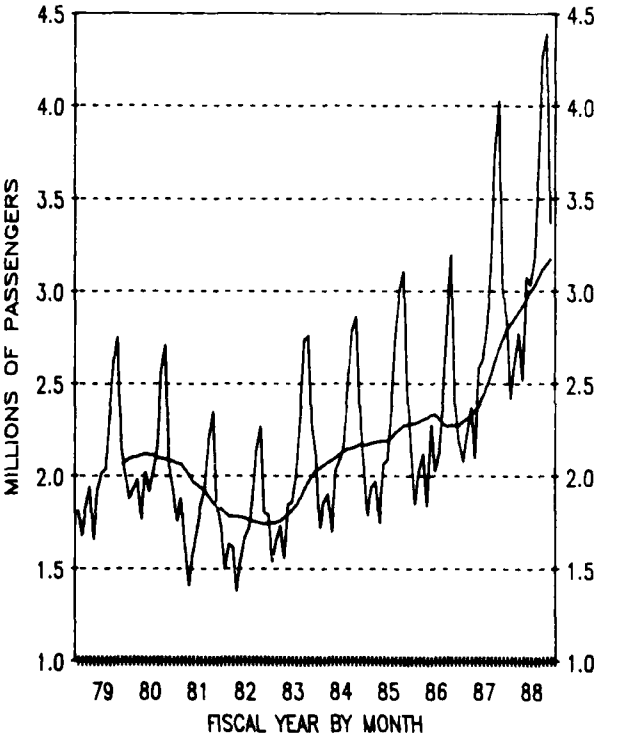
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES

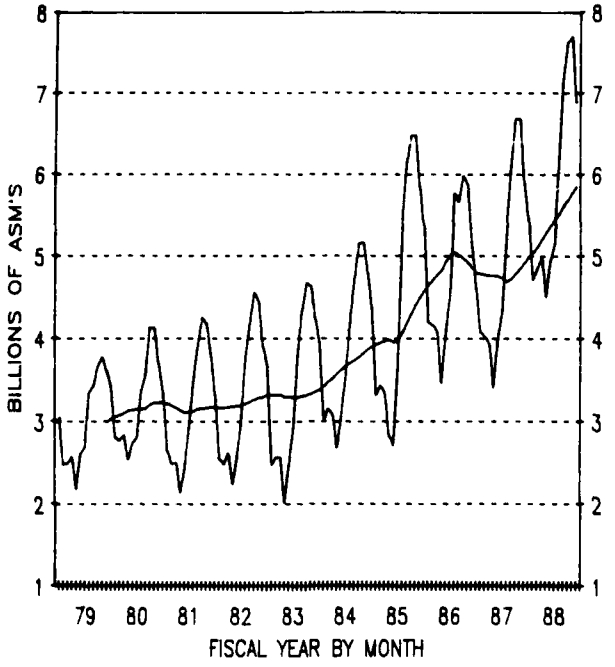


PASSENGER ENPLANEMENTS



U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS - ATLANTIC ROUTES

AVAILABLE SEAT MILES



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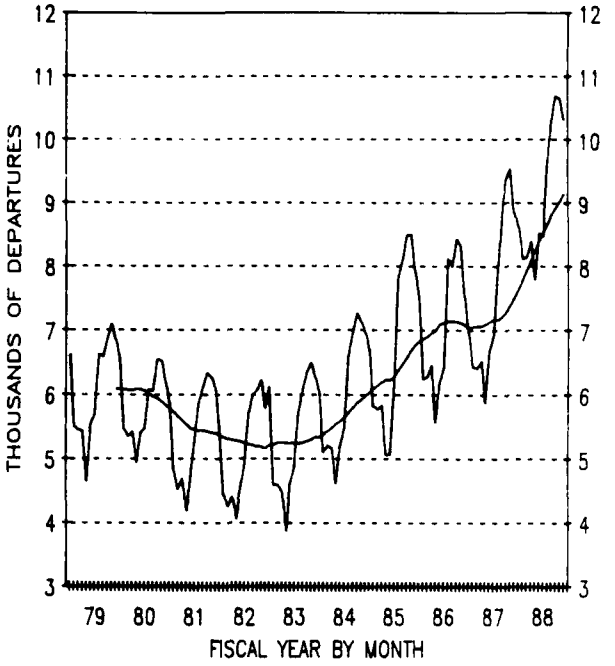
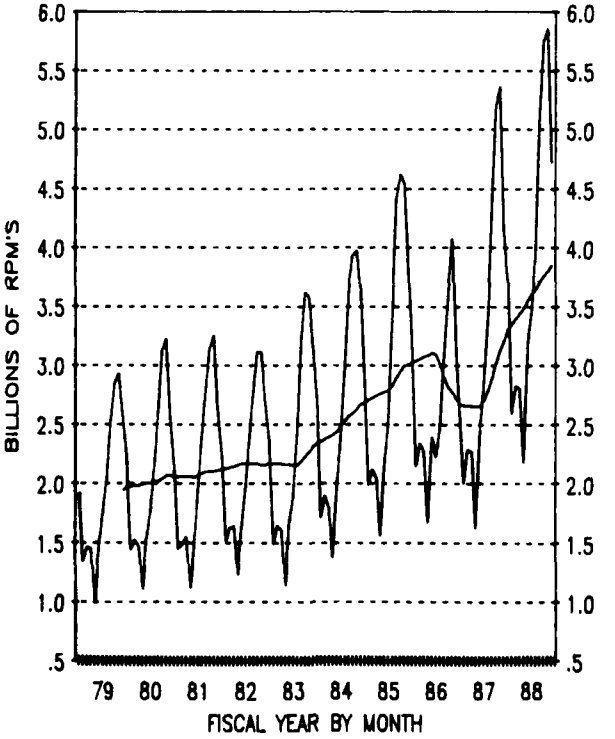
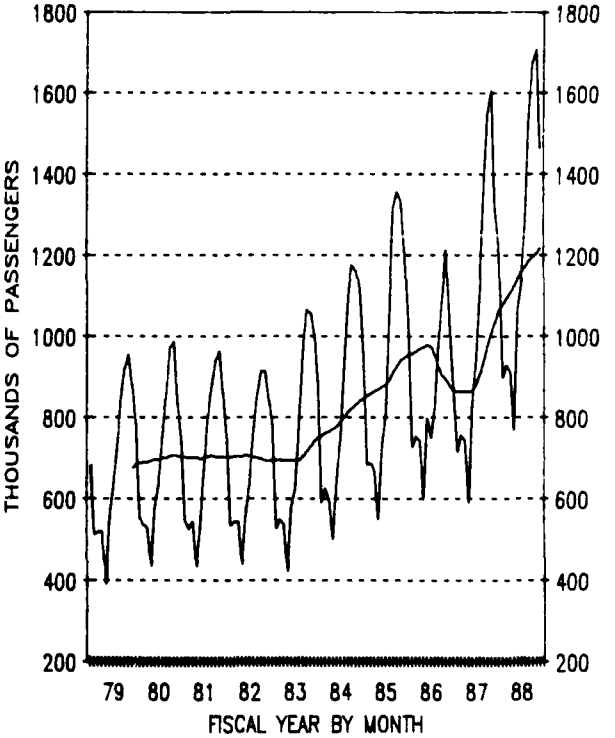


REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



Capacity on the Atlantic routes expanded at a slightly slower pace than did passenger demand in fiscal year 1988, with ASM's (70.1 billion) increasing by 18.9 percent. During the same time period, the number of departures between the United States and Atlantic route destinations increased by 20.5 percent, the larger percentage increase relative to ASM's reflecting the increased use of widebody twins on the transatlantic routes.

Nowhere is the impact of the widebody twin on U.S. air carrier scheduling policies more evident than on the transatlantic routes. The use of the smaller capacity widebody twins allowed U.S. carriers to overfly many of the established international gateways in both the United States and Europe. The institution of new first-time nonstop international service from several interior U.S. airports (e.g., Raleigh/Durham, Charlotte, Cincinnati), and expanded nonstop international service from other interior U.S. cities, stimulated the demand for international travel. Previously, international passenger demand from many of these interior points had been deemed too small to support other than connecting service to major U.S. international gateways.

U.S. airlines achieved an annual load factor of 65.8 percent on the Atlantic routes in fiscal year 1988, 0.5 points above the 1987 load factor, but considerably below the record 69.0 load factor recorded in 1984.

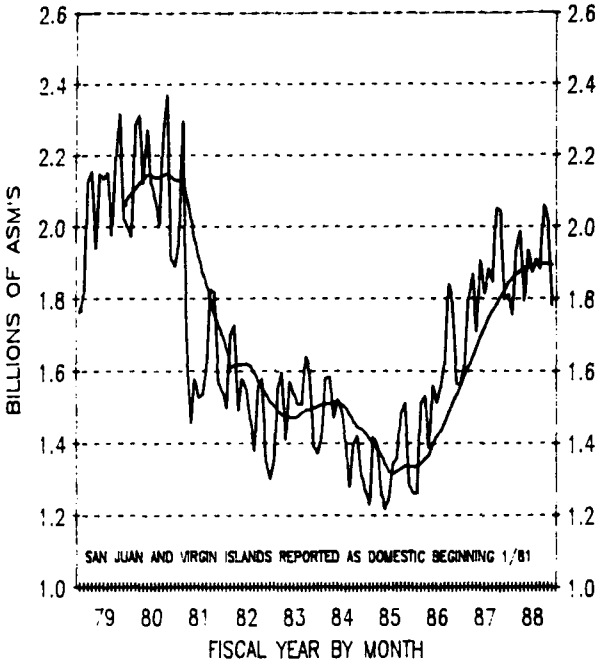
Latin American Routes

Traffic demand to Latin American destinations (South America, Central America, Mexico, and the Caribbean) remained strong in fiscal year 1988. During the last 3 years, passenger miles increased by 47.2 percent and passenger enplanements by 45.4 percent, an average of 13.8 and 13.3 percent, respectively. In fiscal year 1988, passenger miles (14.2 billion) were up 9.4 percent and enplanements (11.5 million) were up 10.6 percent.

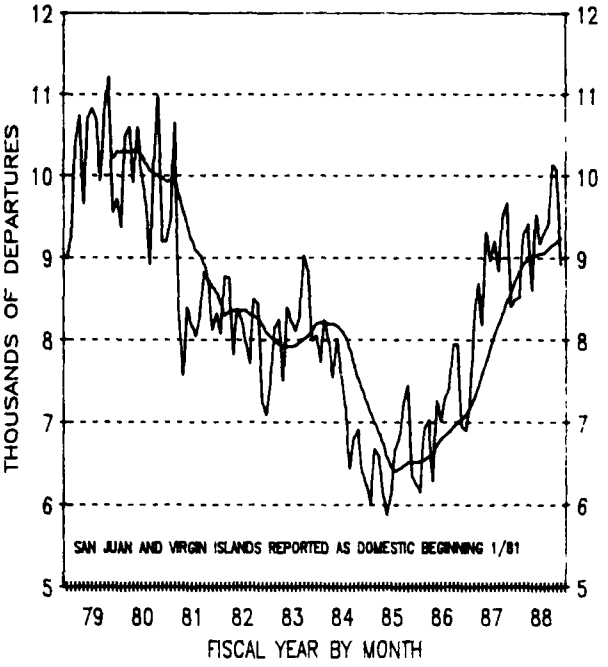
Capacity increases on these routes moderated somewhat in fiscal year 1988. Available seat miles (22.7 billion) grew by 3.8 percent, following increases totaling 36.8 percent over the previous 2 years. The number of aircraft departures between the United States and Latin American destinations increased by 7.9 percent in 1988, the higher growth relative to ASM's reflecting the greater use of smaller aircraft on these routes. Latin American load factors increased substantially in 1988, averaging 62.5 percent. This represents an increase of 3.2 points over the 1987 load factor but is considerably lower than the record 65.7 load factor set in 1979.

U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS - LATIN AMERICAN ROUTES

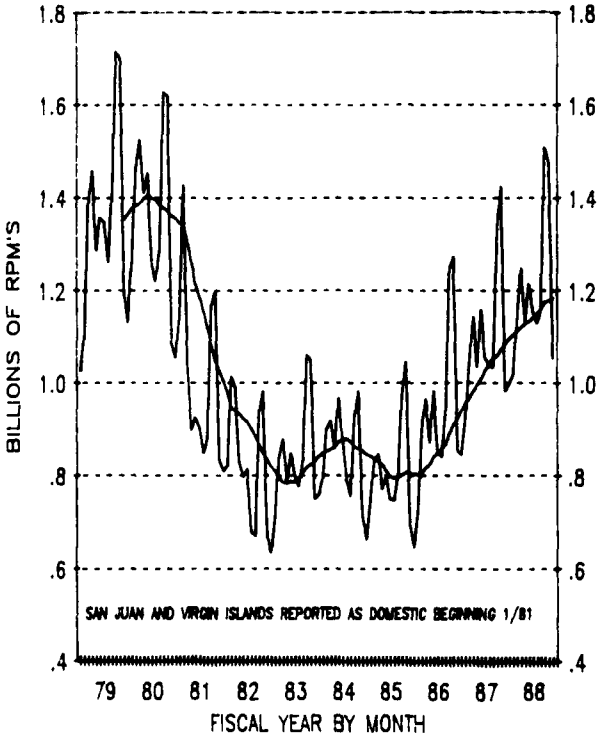
AVAILABLE SEAT MILES



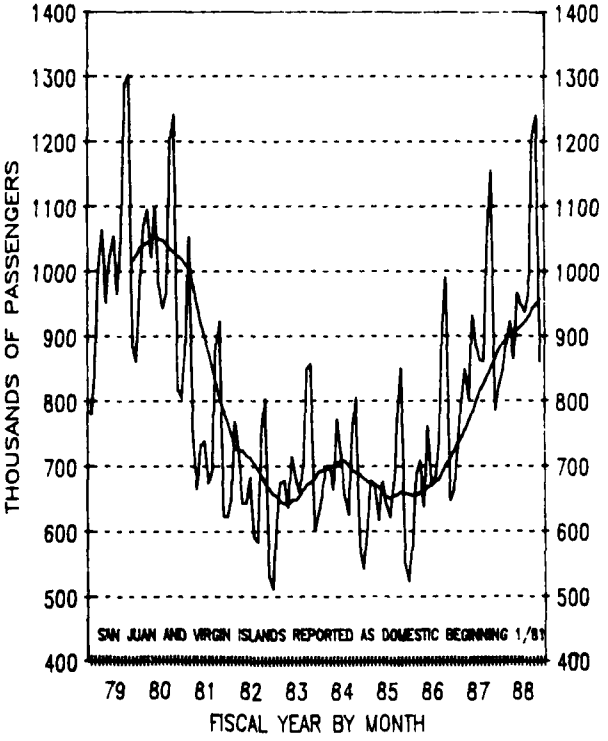
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



Pacific Routes

The Pacific area continues to be the fastest expanding of the three international regions--Atlantic, Latin America, and Pacific--used to describe international travel in the FAA forecasts. Passenger traffic to Pacific destinations increased for a seventh consecutive year in 1988, a period during which the growth in RPM's has averaged 13.2 percent annually, and the growth in enplanements has averaged 13.7 percent. Over the past 2 years, however, passenger demand has increased at an even faster rate, averaging more than 22.0 percent annually. In fiscal year 1988, Pacific route passenger miles (30.2 billion) were up 23.1 percent and enplanements (8.2 million) grew by 23.7 percent.

Capacity increases on Pacific routes have averaged almost 15.0 percent over the past 3 years. In fiscal year 1988, Pacific ASM's (42.5 billion) grew by 16.1 percent while the number of aircraft departures between the United States and Pacific destinations grew by 13.0 percent. Capacity, however, has failed to keep pace with the growth in passenger demand. As a consequence, U.S. airlines reached a record 71.0 percent load factor in 1988, surpassing the previous high of 67.0 percent set 1 year earlier.

NONSCHEDULED TRAFFIC AND CAPACITY

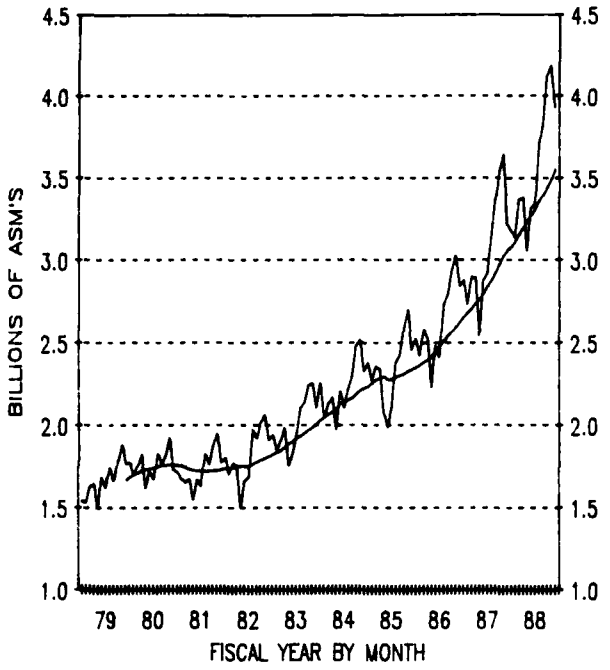
The number of nonscheduled (charter) passengers flying on U.S. commercial air carriers increased by 9.0 percent in fiscal year 1988, to a total of 8.3 million. Domestic enplanements (4.5 million) increased by 13.2 percent while international enplanements (3.9 million) increased by 4.5 percent. Nonscheduled RPM's increased by 7.2 percent in fiscal year 1988, to a total of 14.0 billion. Domestic passenger miles (4.9 billion) were up 11.1 percent, and international passenger miles (9.1 billion) grew by 5.2 percent. Nonscheduled carriers continued to lose share in international markets during 1988. This is due, in large part, to the increase in the number of international gateways and the diversity of geographic locations now served by scheduled airlines.

Nonscheduled capacity increased by 5.6 percent in fiscal year 1988. Domestic seat miles (6.6 billion) were up 6.9 percent and international seat miles (11.0 billion) grew by 4.8 percent. Nonscheduled load factors averaged 79.4 percent in 1988, 1.2 points above the 1987 load factor. Domestic load factors averaged 74.4 percent (up 2.7 points) and international load factors averaged 82.4 percent (up 0.3 points).

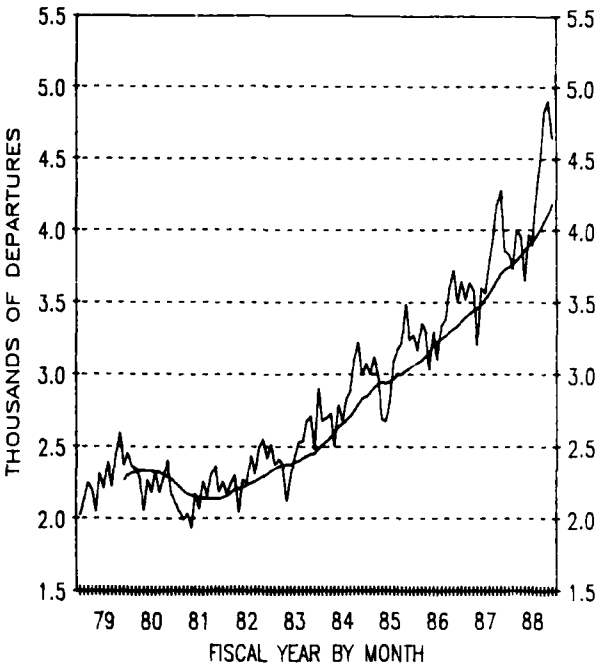
Nonscheduled traffic and capacity statistics may be found in Appendix D.

U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS - PACIFIC ROUTES

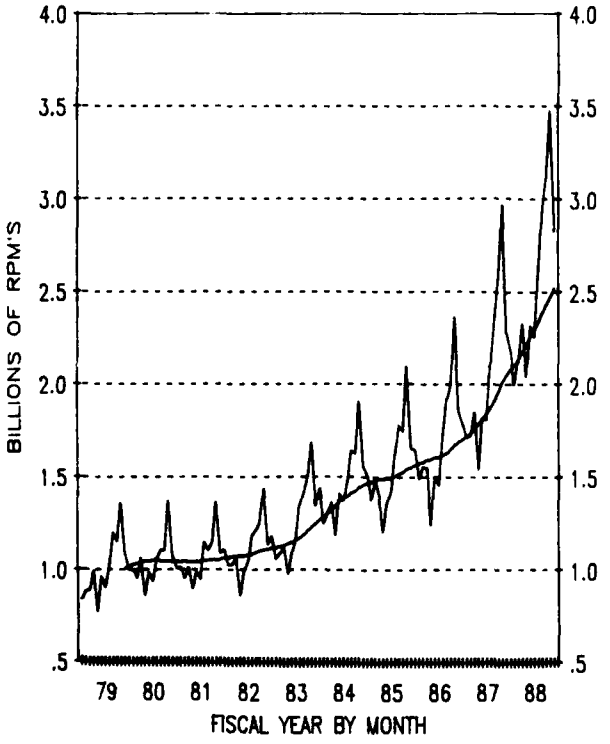
AVAILABLE SEAT MILES



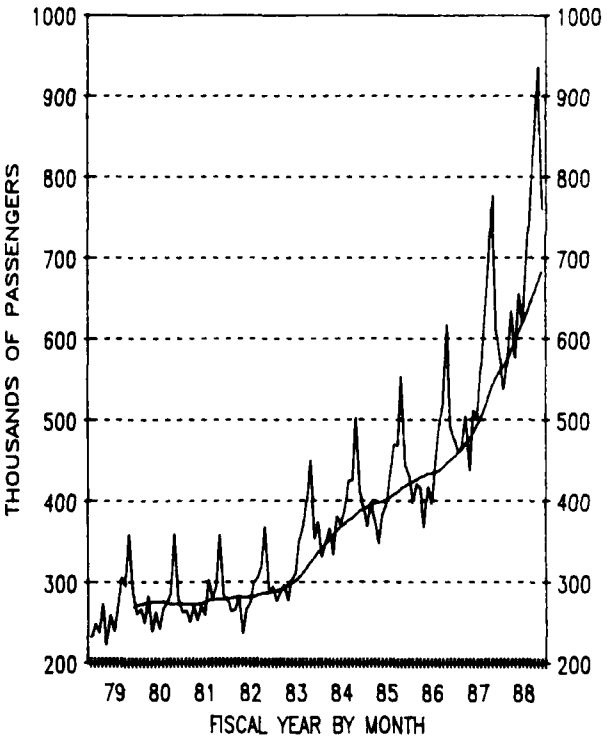
AIRCRAFT DEPARTURES



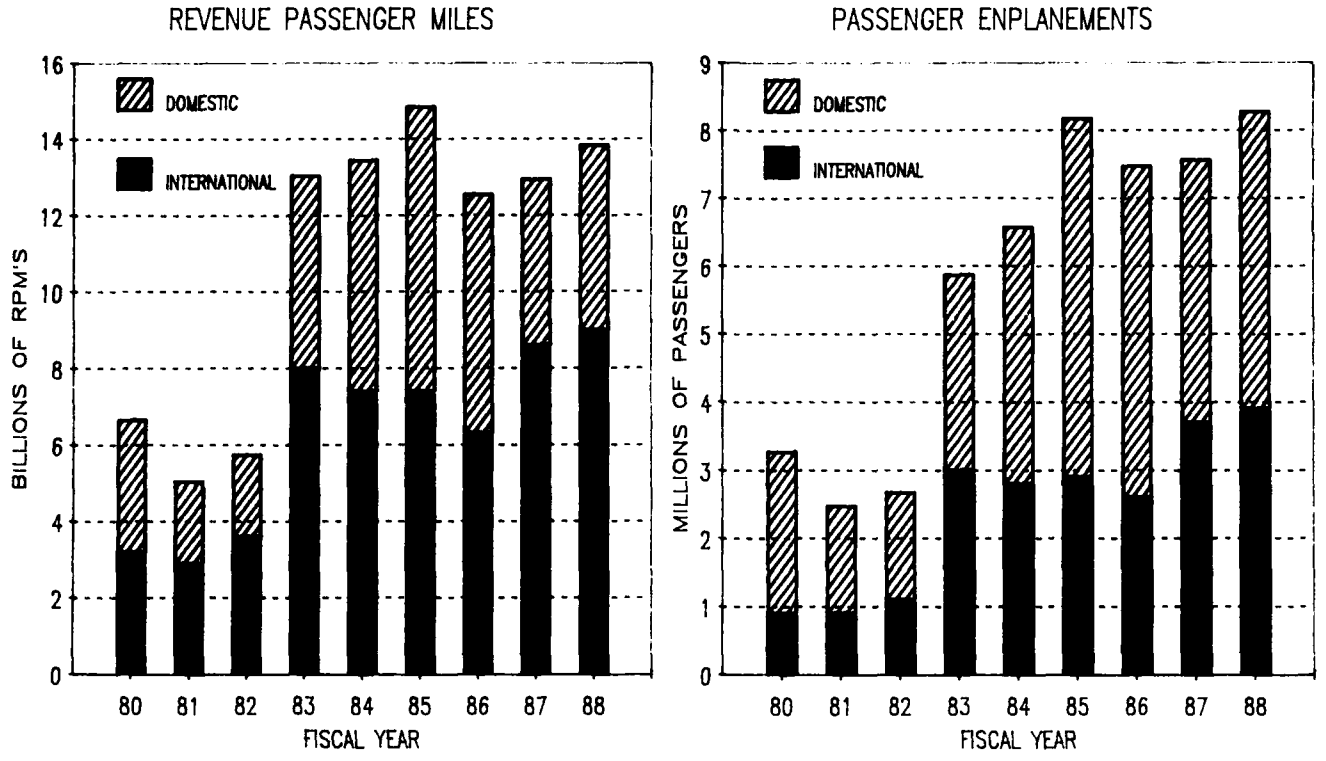
REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



U. S. COMMERCIAL AIR CARRIERS
NONSCHEDULED TRAFFIC



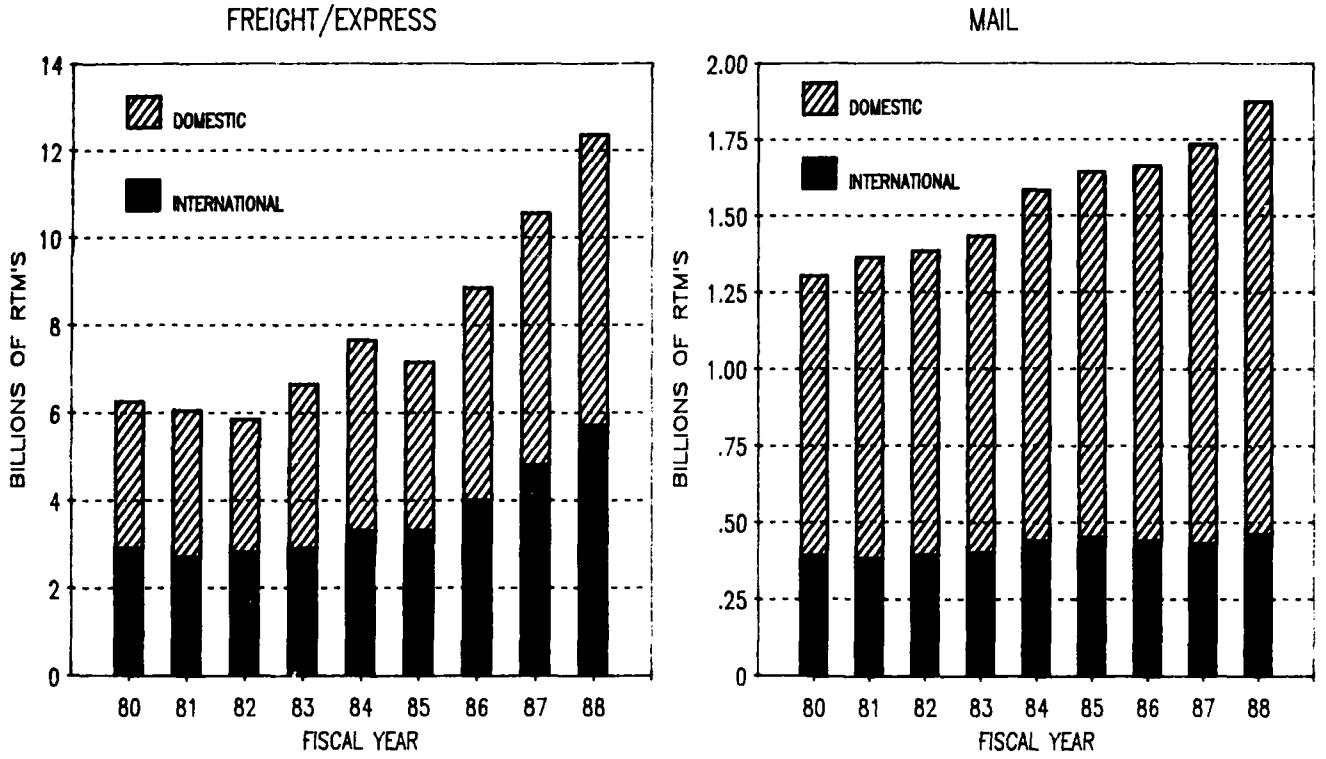
AIR CARGO TRAFFIC

Air cargo revenue ton miles (RTM's) flown by U.S. air carriers reporting on RSPA Form 41 totaled 14.2 billion in fiscal year 1988, an increase of 15.4 percent over 1987. This included an increase of 16.7 percent in total freight and express ton miles (12.3 billion) and an increase of 7.8 percent in mail ton miles (1.9 billion). Domestic freight and express ton miles (6.7 billion) were up 15.2 percent and international freight ton miles (5.7 billion) were up 18.4 percent. Domestic mail RTM's (1.4 billion) increased by 8.2 percent and international RTM's (0.5 billion) grew by 6.4 percent.

The real growth area in the air cargo industry, however, continues to be the small package market. In 1987, there were 20 carriers engaged in the transport of small packages, including four carriers (Airborne, Emery, Purolator, and the U.S. Postal Service) who are not required to report their traffic to RSPA. In light of this fact, the ton mile statistics discussed above do not reflect the total air cargo market. One indication of the magnitude of the small package market is the shipment data compiled by the Air Transport Association of America. According to the data reported for 1987, these 20 air carriers transported a total of 292 million packages, a 33.3 percent increase over 1986. Small package revenues totaled $5.2 billion in 1987, a 13.0 percent increase over revenues of a year earlier.

Domestic and international air cargo statistics may be found in Appendix E.

U. S. COMMERCIAL AIR CARRIERS
AIR CARGO REVENUE TON MILES



A DECADE OF DEREGULATION: FY 1979 to FY 1988

In the fall of 1978, the U.S. Congress deregulated the commercial aviation industry, arguing that the U.S. commercial airline industry had matured and no longer needed the protection afforded them through economic regulation. With the passage of the Airline Deregulation Act of 1978 (hereafter referred to as the Act), several expectations were widely held regarding the benefits of deregulation: (1) there would be improved service to the traveling public; (2) the public would be offered lower fares; (3) U.S. carriers would achieve higher profits; and (4) the resultant commercial airline industry would be more competitive. It has now been 10 years since U.S. air carriers were deregulated. The following pages review and discuss the results of the past decade in light of the expectations held earlier.

IMPROVED SERVICE TO THE TRAVELING PUBLIC

In June 1978, U.S. certificated airlines (the designation prior to deregulation) served a total of 470 airports in 48 states (no service in Delaware and South Dakota) and the District of Columbia. By December 1988, however, the number of airports served by large U.S. air carriers totaled only 232, less than half the number served in 1978. The following table shows that only two states (Florida and Washington) had service to more airports in 1988 than in 1978. Five states (Indiana, Maryland, New York, Ohio, and Rhode Island) and the District of Columbia received service to the same number of airports in both periods. All of the other states had service to a smaller number of airports in 1988.

Included in the total of the 232 airports served in 1988 are 16 airports which did not receive certificated air carrier service in 1978. This means that over the 10-year period since deregulation, a total of 254 airports have lost certificated air carrier service. At first glance it would appear that deregulation has resulted in some 254 cities receiving less service today than they had in 1978. However, the fact is that few, if any, of these cities actually lost all their air service. In fact, many of the cities are receiving air service that is superior, at least from a marketing standpoint, to the service they received in 1978. In 1978, service to many of these cities was subsidized and, as such, generally consisted of one or two flights daily. In addition, service generally was not at the most convenient travel times. Most of the service was provided by local service or regional (Alaskan and Hawaiian) carriers, operating smaller aircraft similar to the aircraft operated by the commuter/regional airlines of today.

Today, many of these communities are served by commuters/regional carriers that operate new technology turboprop aircraft (e.g., Dash-8 and ATR-42) with the comfort and amenities of larger air carrier jet aircraft. With the advent of commuter code-sharing agreements and schedule tie-ins with the larger air carriers, most communities receive more frequent service as well as an increase in the number of available destinations. This is due to the fact that the commuter/regional flights are timed to connect at the larger hub airports with connecting flights to many different destinations.

Despite a cutback in the number of cities served, air carrier activity has increased substantially (up 26.2 percent) during the 10-year period since deregulation. This is largely the result of a proliferation of hub airports supporting carriers' hub-and-spoke route systems. Prior to deregulation, some hub-and-spoke networks did exist, although they were not as numerous as the number in existence today. This was due to the difficulty of obtaining new routes. Deregulation changed all this by making it easier for a carrier to enter more markets and to fly any routes it chooses.

NUMBER OF AIRPORTS SERVED BY U. S. COMMERCIAL AIRLINES

STATE	JUNE 1978	DECEMBER 1988
Alabama	9	4
Alaska	79	25
Arizona	5	2
Arkansas	6	1
California	25	19
Colorado	12	8
Connecticut	2	1
Delaware	0	0
District of Columbia	1	1
Florida	15	18
Georgia	8	4
Hawaii	8	5
Idaho	5	2
Illinois	13	5
Indiana	4	4
Iowa	9	3
Kansas	12	1
Kentucky	4	2
Louisiana	7	5
Maine	6	2
Maryland	1	1
Massachusetts	6	2
Michigan	20	7
Minnesota	11	3
Mississippi	9	2
Missouri	9	3
Montana	15	7
Nebraska	13	2
Nevada	4	2
New Hampshire	3	1
New Jersey	2	2
New Mexico	9	1
New York	12	12
North Carolina	12	8
North Dakota	7	4

(Continued on next page)

NUMBER OF AIRPORTS SERVED BY U. S. COMMERCIAL AIRLINES

STATE	JUNE 1978	DECEMBER 1988
Ohio	7	7
Oklahoma	6	2
Oregon	7	3
Pennsylvania	8	6
Rhode Island	1	1
South Carolina	9	2
South Dakota	0	0
Tennessee	7	5
Texas	17	12
Utah	2	1
Vermont	2	1
Virginia	10	7
Washington	4	5
West Virginia	8	2
Wisconsin	11	7
Wyoming	8	2
TOTAL AIRPORTS SERVED	470*	232*

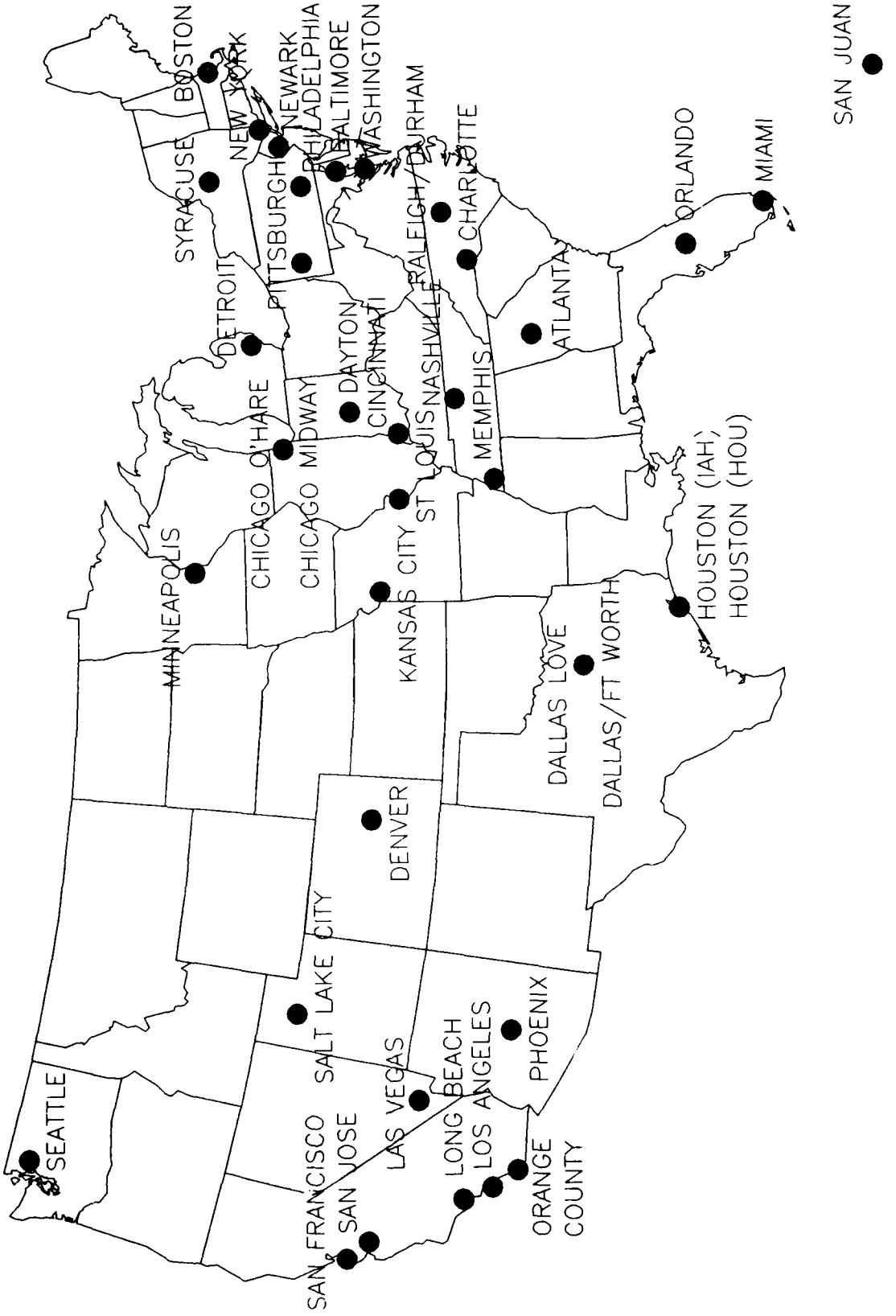
Source: Official Airline Guide

* Airports served by large U.S. carriers (operating aircraft with over 60 seats).

There are approximately 35 hub airports in existence today, each supporting one or two carrier hub-and-spoke route systems. This compares to only four airports (Atlanta, Chicago O'Hare, Denver, and Dallas/Ft. Worth) that could be described as hub-and-spoke airports prior to 1979. Air carrier operations at the 35 hub airports have increased by 44.3 percent during the 10-year period since deregulation, more than 50.0 percent faster than the increase in total air carrier activity (up 25.7 percent) over the same time period.

The following table shows the growth in activity between 1978 and 1988 for each of the 35 hub airports. Only one of the hub airports (New York J.F. Kennedy) declined over the 10-year period. This decline is due more to the large increase in the number of alternative international gateways than to a decrease in hubbing activity. Generally, the smaller secondary hubs (e.g., Charlotte, Phoenix, and Raleigh/Durham) grew at faster rates than the average growth for all hubs. The largest hubs have generally exhibited the slowest growth over the 10-year period, reflecting the fact that many of these airports have reached, or are approaching, physical capacity saturation.

MAJOR U.S. HUBS



AIR CARRIER OPERATIONS AT U. S. HUB AIRPORTS

FISCAL YEARS 1978 AND 1988

HUB AIRPORT	AIR CARRIER OPERATIONS FY 1978	AIR CARRIER OPERATIONS FY 1988	AVERAGE ANNUAL PERCENT CHANGE
Atlanta (ATL)	484,630	562,698	1.5%
Baltimore (BWI)	74,410	151,209	7.3
Boston (BOS)	217,752	246,423	1.2
Charlotte (CLT)	67,982	213,291	12.1
Chicago O'Hare (ORD)	598,304	631,073	0.5
Chicago Midway (MDW)	1,946	112,213	50.0
Cincinnati (CVG)	76,226	141,316	6.4
Dallas/Ft. Worth (DFW)	311,494,	490,327	4.6
Dallas Love (DAL)	34,985	77,829	8.3
Dayton (DAY)	50,963	109,649	8.0
Denver (DEN)	268,586	374,614	3.4
Detroit (DTW)	162,776	250,445	4.4
Houston Hobby (HOU)	27,863	117,720	15.5
Houston Intercontinental (IAH)	160,705	205,969	2.5
Kansas City (MCI)	123,260	138,710	1.2
Las Vegas (LAS)	112,891	177,700	4.6
Long Beach (LGB)	5,796	18,007	12.0
Los Angeles (LAX)	375,924	435,751	1.5
Memphis (MEM)	140,557	211,732	4.2
Miami (MIA)	245,472	254,597	0.4
Minneapolis/St. Paul (MSP)	127,036	214,025	5.4
Nashville (BNA)	63,456	111,163	5.8
Newark (EWR)	133,304	282,488	7.8
New York Kennedy (JFK)	277,332	221,615	(2.3)
Orange County (SNA)	29,834	61,987	7.6
Philadelphia (PHL)	145,662	195,506	3.0
Phoenix (PHX)	99,540	268,627	10.4
Pittsburgh (PIT)	195,022	256,627	2.8
Raleigh/Durham (RDU)	33,749	125,826	14.1
St. Louis (STL)	190,269	285,710	4.8
Salt Lake City (SLC)	75,222	145,781	6.8
San Francisco (SFO)	265,720	321,420	1.9
San Juan (SJU)	47,783	61,580	2.6
Seattle/Tacoma (SEA)	117,744	175,746	4.1
Syracuse (SYR)	33,147	74,748	8.5
Washington Dulles (IAD)	55,175	152,614	10.7

Source: FAA Air Traffic Activity (selected reports)

DELAYS AT SELECTED U. S. HUB AIRPORTS
(In Average Minutes Per Operation)

AIRPORTS	1978	1987	PERCENT CHANGE 1978 - 1988
Atlanta (ATL)	N.A.	9.1	-
Boston (BOS)	6.7	8.7	29.9
Baltimore (BWI)	4.0	6.1	52.5
Cleveland (CLE)	4.5	4.7	4.4
Charlotte (CLT)	N.A.	5.0	-
Chicago O'Hare (ORD)	9.3	11.3	21.5
Cincinnati (CVG)	3.5	5.6	60.0
Dayton (DAY)	N.A.	6.4	-
Washington National (DCA)	6.5	8.6	32.3
Denver (DEN)	9.2	8.1	(12.0)
Dallas/Ft. Worth (DFW)	4.6	9.4	104.4
Detroit (DTW)	4.6	6.7	45.7
Newark (EWR)	7.7	10.6	37.7
Washington Dulles (IAD)	4.7	9.3	97.9
Houston Intercontinental (IAH)	4.8	5.7	18.8
Indianapolis (IND)	3.8	4.9	29.0
New York Kennedy (JFK)	10.8	10.9	0.9
Los Angeles (LAX)	6.2	9.8	58.1
New York LaGuardia (LGA)	9.2	9.9	7.6
Memphis (MEM)	3.3	4.6	39.4
Miami (MIA)	5.4	7.3	35.2
Minneapolis/St. Paul (MSP)	3.1	5.8	87.1
Nashville (BNA)	N.A.	8.5	-
Orlando (MCO)	N.A.	6.0	-
Philadelphia (PHL)	8.3	8.6	3.6
Phoenix (PHX)	3.9	7.1	82.1
Pittsburgh (PIT)	5.7	5.7	-
Raleigh/Durham (RDU)	3.8	7.1	86.8
Seattle (SEA)	3.4	5.2	52.9
San Francisco (SFO)	4.5	8.8	95.6
St. Louis (STL)	6.0	7.2	20.0
Tampa (TPA)	4.2	4.8	14.3
TOTAL SYSTEM	5.8	7.8	34.5

Source: Federal Aviation Administration, Standardized Delay Reporting System

This saturation of the larger hub airports, and the attendant congestion and delays, led to the establishment of secondary hub airports. One of the major disadvantages associated with the development and expansion of the hub-and-spoke route system is that it has resulted in a greater number of air carrier operations being scheduled into a relatively few number of airports. The only possible result of such behavior is readily apparent and predictable. That is, increased airport congestion and an increase in the number and length of delays in the National Airspace System.

Delays in the National Airspace System increased by 34.5 percent between 1979 and 1987, growing from an average of 5.8 minutes per operation in 1978 to 7.8 minutes per operation in 1987. As shown in the table on the preceding page, delays at many of the larger hub airports (Chicago O'Hare, New York Kennedy, Newark, Atlanta) exceed the average system delay. In addition, delays have increased significantly at the new secondary hub airports (up 82.1 percent at Phoenix, up 86.8 percent at Raleigh/Durham) and are fast approaching the average delays associated with more congested larger hub airports. Clearly, there is a delay cost associated with the increased hubbing activity and improved service that has occurred since deregulation. The question is to what extent the traveling public is willing to pay the delay cost that is associated with more frequent, lower cost flights, to more destinations. Airline management found it necessary to increase published flight times in 1988, largely in response to the public outcry and media attention given to flight delays and airport congestion during much of 1987. This could mean that the industry believes that the average traveler is not willing to pay that cost.

In summary, the number of communities served by the larger commercial airlines has been halved since 1978, although few, if any, communities actually lost air service. An increase in the number of hub-and-spoke route systems and hub airports has greatly increased the number of travel destinations available to a large number of potential air travelers. Hubbing is also largely responsible for the large increase in the number of air carrier operations that has occurred since 1978 and, consequently, is partially responsible for the increase in airport congestion and flight delays. Overall, it would appear that the majority of the traveling public has benefited from better service since deregulation, although for an individual traveler, the benefit may well depend on where one lives and where one wishes to travel.

LOWER FARES TO THE TRAVELING PUBLIC

There are two ways to compare the price that the traveling public is paying for air travel. One of the most commonly used and universally accepted measures is the passenger yield. Passenger yields reflect the amount of revenue (generally expressed in cents per passenger mile) that an air carrier receives from a revenue passenger.

From the passenger yield data in the following table, one would conclude that the price of air travel (in 'real' dollars), has declined more than 20.0 percent (2.3 percent annually) in the 10 years since passage of the Act. By the same measure, the average price of international travel has declined at an even faster rate, down more than 25.0 percent (2.9 percent annually) over the same 10-year period. But yields represent the average of all revenue passengers who flew during the particular time being measured and, as such, they do not really reflect the real cost of travel between any two cities. For example, if the average 1988 domestic yield (12.24 cents) were applied to the New York - Washington route (214 miles), the resulting fare would be $26.19. In reality, however, the stated fare in the market is $99.00 (a yield of 46.26 cents), although the average fare in the market ($75.00) is somewhat less when discounted weekend fares and frequent flyer travel are taken into account.

AVERAGE PASSENGER YIELD

COMPARISON OF FISCAL YEARS 1978 AND 1988

(CENTS)

	FY 1978	FY 1988	AVERAGE ANNUAL PERCENT CHANGE
Current Dollars			
Domestic	8.283	12.350	4.1
International	7.498	10.278	3.2
System	8.132	11.899	3.9
Real (1980-82) Dollars			
Domestic	12.962	10.556	(2.1)
International	11.733	8.784	(2.9)
System	12.726	10.170	(2.3)

Source: RSPA Form 41

Another way to compare the cost of air travel is to look at the actual fares that passengers pay to fly between two cities. This was possible, to a certain extent, prior to deregulation, by comparing the published coach and first class fares listed in the Official Airline Guide (OAG). However, today's complex pricing system, with its myriad fares for each city-pair, precludes such measurement. On a fully loaded flight, it is conceivable, although not very likely, that no two passengers would have paid the same fare.

The fares between selected city-pairs were compared using the origination and destination (O&D) 10 percent sample data collected and compiled by RSPA. The data are compiled on a quarterly basis by sampling every tenth flight coupon (those ending in zero) and recording, among other pertinent facts, the actual fare paid for the flight. Since these tabulated fares represent the average fare for a city-pair they suffer from flaws similar to those found in utilizing average yields. In addition, the data are subject to sampling error and may not be as accurate as the yield data (100 percent sample) or as reliable for the more densely traveled city-pairs.

The O&D city-pair fare data may be better suited for use in analyzing whether the traveling public has benefited from lower fares as a result of deregulation. The 50 city-pairs chosen for analysis represent a geographic sampling of both short-haul and long-haul markets, competitive and monopoly markets, and travel in and between large, medium, and small hub airports.

There is a strong correlation between first quarter 1979 fares and city-pair mileage, reflecting the mileage-based pricing policy that was in effect prior to passage of the Act. In fact, this pricing policy gave rise to the charge that long-haul flights were subsidizing short-haul travel, and it became one of the primary arguments for deregulation of the air industry. Although first quarter 1988 average fares in the shorter distance markets are still generally less than the average fares in the longer distance markets, the almost linear relationship that had existed between fares and mileage has been virtually eliminated.

It would appear that the airlines have corrected the alleged pricing inequities of the pre-deregulation era. Between 1979 and 1988, 'real' fares increased in all but three of the 25 markets under 700 miles in distance. During the same time period, 'real' fares declined in 17 of the 25 markets over 800 miles in distance, and 'real' fares declined in 13 of the 15 selected city-pairs more than 1,100 miles apart.

The proponents of deregulation may view these shifts as a restructuring of pricing policy to better reflect the actual costs of providing service. Critics of deregulation may say that short-haul travel is now subsidizing long-haul service. Whichever view is held, the fact remains that there has been a dramatic shift in pricing policies since the passage of the Act.

On average, 'real' fares have fallen since 1978, but this phenomena has not been uniformly distributed among all city-pair markets. Some fares are significantly lower than they were prior to deregulation: e.g., Los Angeles to Phoenix, actual fare down 30.0 percent; 'real' fare down 58.0 percent since 1979. On the other hand, some fares are significantly higher than they were prior to deregulation: e.g., Indianapolis to St. Louis, actual fare up 297.0 percent since 1979.

AVERAGE FARE BETWEEN SELECTED CITY PAIRS

1ST QUARTER 1979 AND 1ST QUARTER 1988

CITY PAIR	MILEAGE	AVERAGE FARE - ONE WAY 1ST QUARTER 1979 CURRENT $	1980-82 $	1ST QUARTER 1988 CURRENT $	1980-82 $	AVERAGE ANNUAL PERCENT CHANGE CURRENT $	1980-82 $
ATL-BHM	134	$30	$43	$ 76	$64	10.9%	4.5%
DAY-DTW	166	33	47	83	71	10.8	4.7
DCA-LGA	214	38	54	75	64	7.8	1.9
IND-STL	229	38	54	151	129	16.6	10.2
DCA-GSO	248	40	57	112	96	12.1	6.0
ATL-PNS	272	40	57	92	79	9.7	3.7
IAH-MSY	303	40	57	135	115	14.5	8.1
BDL-DCA	313	44	62	88	75	8.0	2.1
CLT-JAX	329	50	71	138	118	11.9	5.8
LAX-SFO	337	26	37	73	62	12.1	5.9
LAS-SLC	368	51	72	59	50	1.6	(4.1)
LAX-PHX	370	47	67	33	28	(4.0)	(10.2)
IAH-OKC	395	54	77	145	124	11.6	5.4
BOS-DCA	399	54	71	138	118	11.0	4.9
ABQ-SLC	492	80	113	112	96	3.8	(1.8)
CVG-DSM	505	62	88	195	167	13.6	7.3
BWI-IND	515	62	88	112	96	6.8	1.0
ATL-PIT	526	64	91	143	122	9.3	3.3
ATL-PBI	545	60	85	149	127	10.6	4.6
ATL-MIA	595	67	95	126	108	7.3	1.4
BOS-RDU	612	75	106	141	121	7.3	1.5
MKE-TUL	631	74	105	154	132	8.5	2.6
MEM-PIT	652	79	112	184	157	9.9	3.9
MIA-MSY	674	73	104	147	126	8.1	2.2
BNA-PHL	675	73	104	162	138	9.3	3.2
MCO-PHL	861	68	96	110	94	5.5	(0.2)
LGA-STL	888	92	131	206	165	9.9	2.6
HLN-MSP	913	101	143	174	149	6.2	0.5
BWI-FLL	925	83	118	121	103	4.3	(1.5)
CLE-TPA	927	70	99	113	97	5.5	(0.2)

(Continued on next page)

AVERAGE FARE BETWEEN SELECTED CITY PAIRS

1ST QUARTER 1979 AND 1ST QUARTER 1988

		AVERAGE FARE - ONE WAY				AVERAGE ANNUAL PERCENT CHANGE	
		1ST QUARTER 1979		1ST QUARTER 1988			
CITY PAIR	MILEAGE	CURRENT $	1980-82 $	CURRENT $	1980-82 $	CURRENT $	1980-82 $
DEN-PDX	985	$87	$123	$151	$129	6.3%	0.5%
IAH-PHL	1,009	96	136	169	144	6.5	0.6
MCI-PHL	1,039	99	140	186	159	7.3	1.4
BOI-OMA	1,048	93	132	168	144	6.8	1.0
LGA-MIA	1,097	91	129	124	106	3.5	(2.2)
SLC-STL	1,156	110	156	153	131	3.7	(2.0)
DFW-LAX	1,235	102	145	174	149	6.1	0.3
BOS-MIA	1,258	98	139	141	121	4.1	(1.6)
MCI-SAN	1,333	109	155	101	86	(0.9)	(6.8)
MSP-LAX	1,536	117	166	160	137	3.5	(2.2)
ORD-SEA	1,721	133	189	183	156	3.6	(2.2)
ORD-PDX	1,739	138	196	180	154	3.0	(2.7)
ORD-LAX	1,745	112	159	215	184	7.5	1.6
BOS-DEN	1,767	124	176	194	166	5.1	(0.7)
CLT-LAX	2,125	156	221	219	187	3.8	(1.9)
PIT-SEA	2,135	169	240	198	169	1.8	(4.0)
ATL-SEA	2,182	181	257	216	185	2.0	(3.7)
IAD-SFO	2,419	190	270	236	202	2.4	(3.3)
JFK-LAX	2,475	179	254	224	191	1.6	(3.2)
BOS-SEA	2,496	194	275	207	177	0.7	(5.0)

Source: RSPA O&D Data

Whether the fare an individual traveler pays is higher or lower than would have been the case without deregulation ultimately depends on: where one lives; which cities one wishes to fly between; the number of competing carriers in those markets; whether one is able to plan his or her travel in advance; whether one is able to travel at non-peak hours or days of the week; and often, whether one is willing to accept substantial cancellation penalties. Discount fares are available in most, if not all, markets. It is up to the individual air traveler to seek them out.

HIGHER PROFITS FOR U.S. AIRLINES

After a somewhat inauspicious beginning during the first 5 years of deregulation, the U.S. commercial airline industry's financial fortunes have improved significantly. The industry's slow start was the result of a number of factors, including airline management's lack of experience in competing in an unregulated market. In defense of airline management, however, the early years of deregulation were by no means the best of times. Starting in 1979, OPEC precipitated the second world oil crisis, with the run-up in jet fuel prices severely affecting U.S. airlines. In addition, the U.S. economy went through two economic recessions (1980 and 1982) which, in turn, reduced the demand for air travel. In an effort to stimulate traffic, U.S. airlines resorted to industry-wide fare wars, with disastrous financial results.

The U.S. commercial airline industry incurred operating and net losses in three of the first 5 years of deregulation. During the 5-year period between 1979 and 1983, U.S. carriers posted cumulative operating losses of over $1.0 billion and cumulative net losses of $967 million. Starting in 1984, however, the industry's financial performance turned around. The industry posted an operating profit in each of the next 5 years, with cumulative operating profits totaling over $10.1 billion over the 5-year period. The industry also earned a net profit in four of the 5 years, with a 5-year cumulative net profit of almost $3.2 billion. While the air industry's rate of return is still below that of other unregulated industries, it does appear that airline management has learned to adjust to the new economic realities of deregulation.

Although the industry's overall financial fortunes have improved, not all carriers have shared equally in the financial turnaround. There have been a number of Chapter 11 bankruptcies since deregulation and more probably would have occurred except that the failing carriers merged with or were taken over by other carriers. Airline profits tend to be concentrated among a relatively few carriers. Only two carriers (USAir and Piedmont) have been profitable from both an operating and net position in each of the 10 years since deregulation. Over the 10-year period, the cumulative operating profits of just five carriers--American, Delta, Northwest, and the USAir Group (USAir and Piedmont)--have accounted for 85.9 percent of the cumulative operating profits of the entire industry. The cumulative net profits of this same group of carriers were more than double the cumulative industry total over the same time period.

Just as profits tend to be concentrated among a relatively few carriers, so do losses. Most of the carriers, although profitable, have managed to post only meager operating profits over the 10-year period and that most have incurred net losses over the period. The large re-equipment programs currently underway in the industry raise the question of how the new aircraft are to be financed. While aircraft leasing arrangements have given the industry room to maneuver, this does not entirely solve the industry's long-term financial problem.

AIR CARRIER FINANCIAL RESULTS

CUMULATIVE RESULTS: FY 1979 TO FY 1988
($ MILLIONS)

CARRIER*	OPERATING PROFITS	NET PROFITS
American	$2,504.1	$1,604.0
Delta	1,754.7	1,296.4
Northwest	1,204.8	581.9
Pan American	(1,652.2)	(1,368.4)
Texas Air Corp.	503.9	(1,687.8)
Continental	137.8	(829.4)
Eastern	366.1	(858.4)
Trans World	205.5	(57.6)
United	577.4	555.1
USAir Group	2,333.0	1,390.8
USAir	1,397.4	860.7
Piedmont	935.6	530.1
Total Majors	$7,431.2	$2,314.4
Total All Others	1,917.7	24.0
Total All Carriers	$9,348.9	$2,338.4

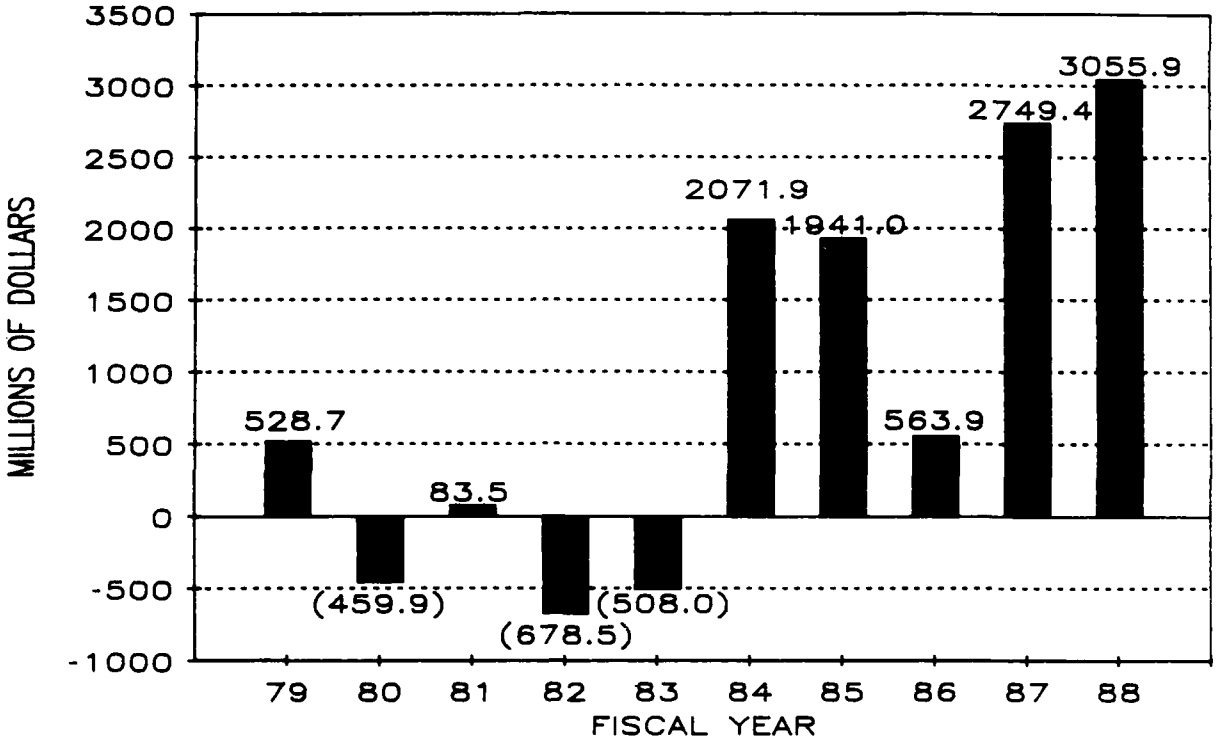
Source: RSPA Form 41

* Includes financial results of merged carriers for entire period.

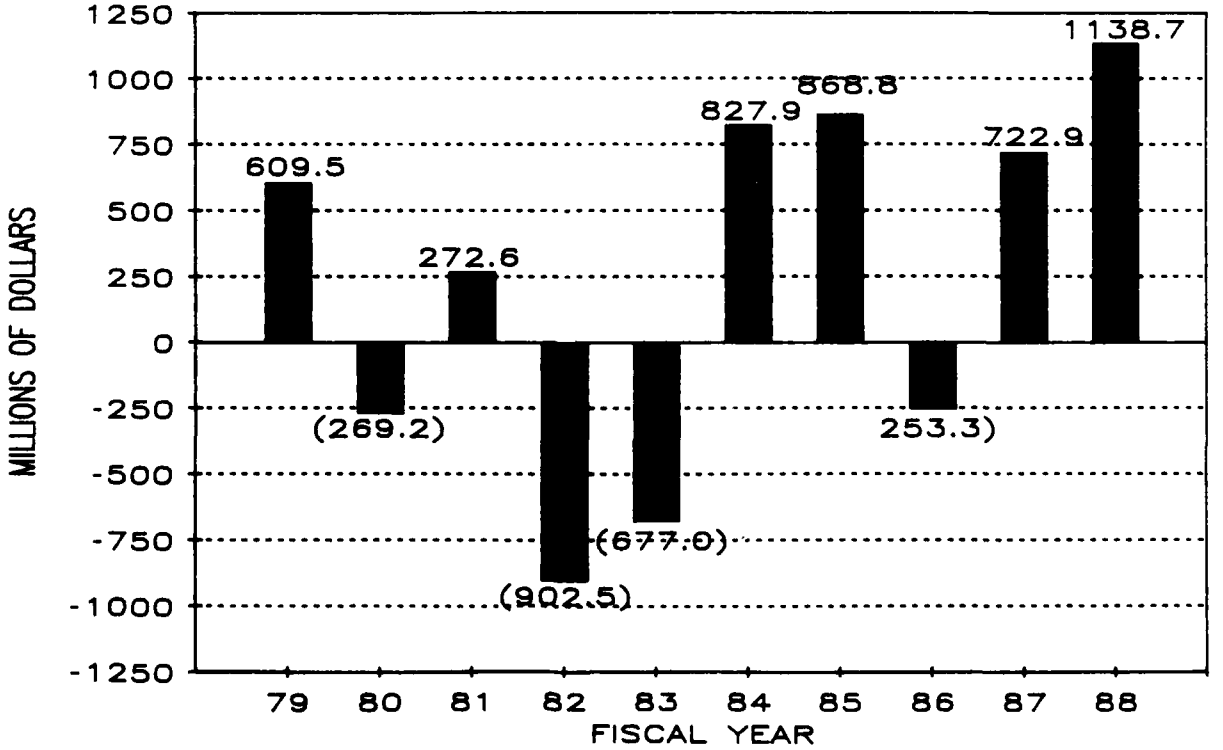
The industry's real financial problem is and will continue to be the sizable long-term debt currently held by the industry and the revenues that must be generated annually to service the debt. Over the past decade, the industry's long-term debt has almost tripled, growing from $4.4 billion in the fourth quarter of 1978 to $12.3 billion in the third quarter of 1988. Over this 10-year period, it has cost the industry a total of $13.6 billion to service the debt, growing from an annual payment of $667 million in fiscal year 1979 to $1.7 billion in 1988. With almost 2000 aircraft on order, the amount of long-term debt held by the industry can only increase. What happens if there is another large increase in oil prices or a serious downturn in the economy? This is a possible scenario if we are to believe some of the econometric forecasting services. In such an event, it is not only the carriers in financial trouble that will be impacted but the marginally profitable carriers as well.

A DECADE OF DEREGULATION

U. S. AIR CARRIER OPERATING PROFITS



U. S. AIR CARRIER NET PROFITS



In summary, the industry's overall financial position has improved considerably over the past several years but there is considerable disparity between individual carriers. Profits, especially at the net level, tend to be concentrated among a relatively few large carriers. The industry's long-term debt and the interest payments thereon continue to be a major concern. What this all portends for the traveling public is not at all certain, although the bankruptcy of a major airline would surely result in a further concentration of traffic and profits. Higher fares are probably the predictable result.

A MORE COMPETITIVE COMMERCIAL AIRLINE INDUSTRY

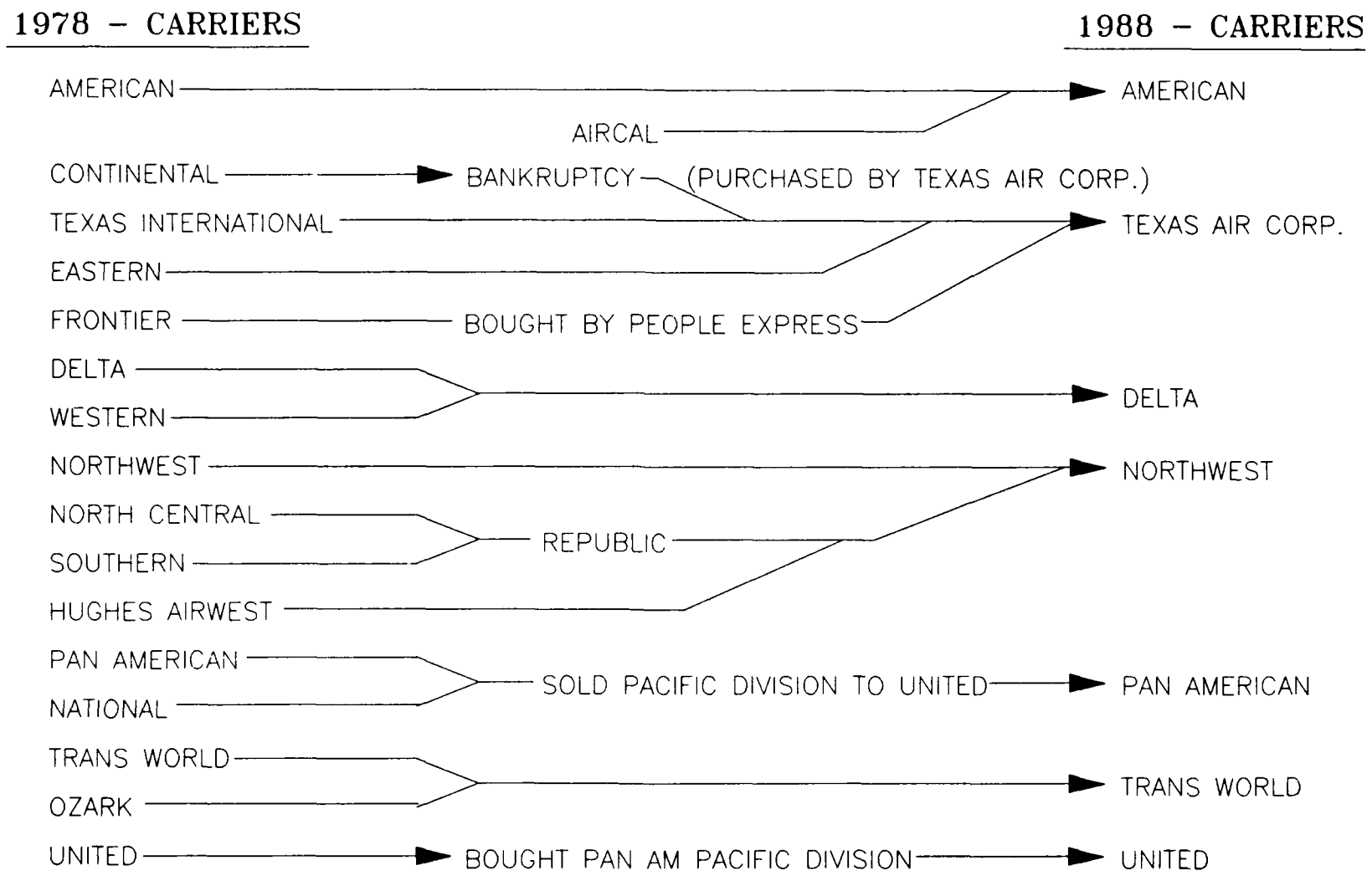
In 1978, the commercial airline industry consisted of 30 scheduled passenger airlines; classified by the Civil Aeronautics Board as Trunks (11), Local Service (8), Regional (2), Alaskan (5), Hawaiian (2), and Other (2). At the end of fiscal year 1988, the industry consisted of 35 scheduled passenger airlines; classified by the Department of Transportation as Majors (10), Nationals (9), and Regionals (16). During this 10-year period, the industry has gone through three distinct phases--expansion, consolidation, and concentration--and has embarked upon a fourth. The discussion that follows will comment briefly on each of these stages of the deregulation process.

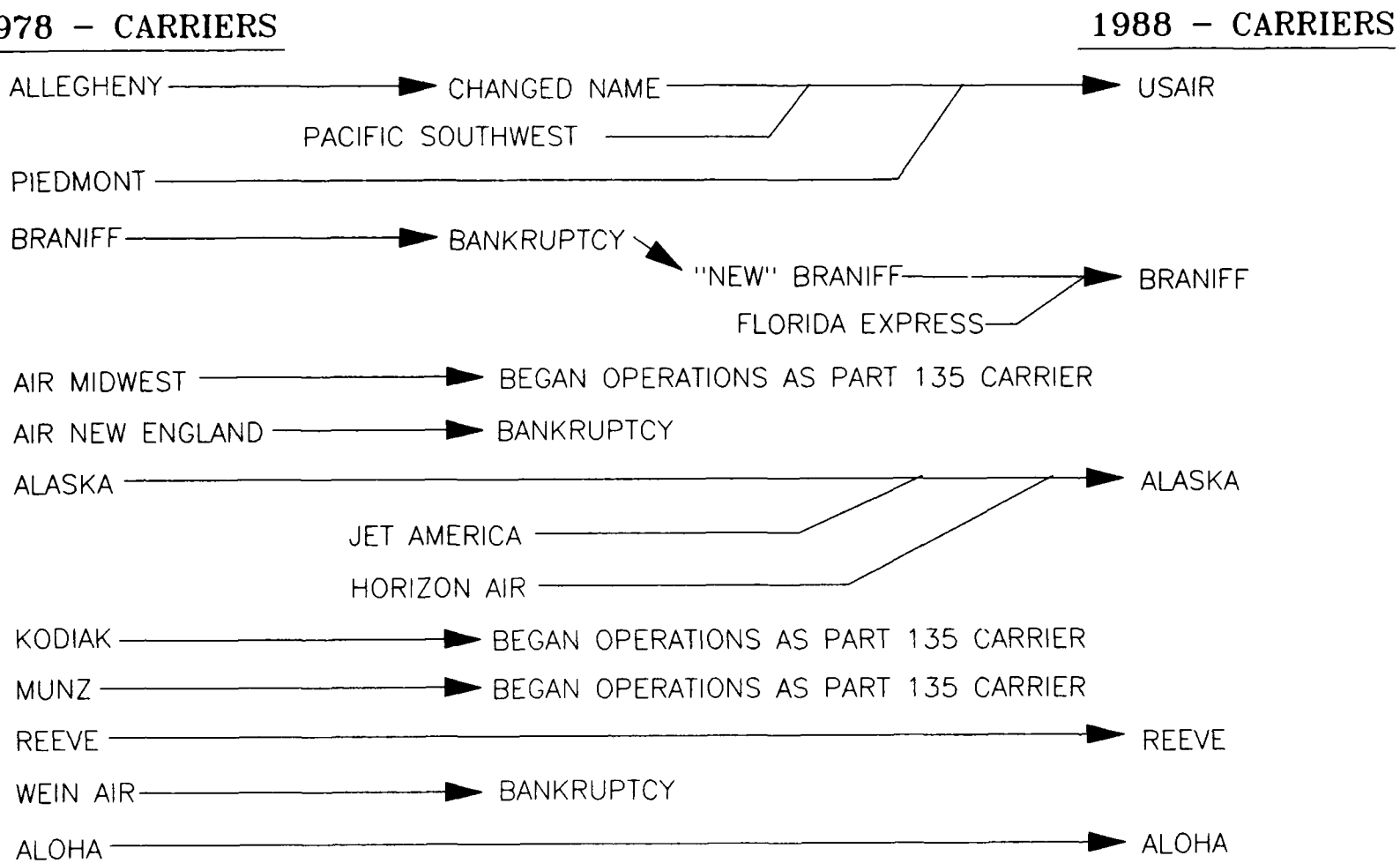
Expansion Phase

Over the last 10 years, approximately 77 additional air carriers have, at one time or another, provided scheduled passenger service, with the total number of carriers (including charter and cargo carriers) reaching a peak of 123 in February 1984. The new carriers consisted of former intrastate carriers (Southwest and Pacific Southwest), former charter carriers (Capitol and World), former commuters (Air Wisconsin and Horizon Air), and new entrants (America West, Midway, and People Express). Unfortunately, 60 of these carriers are no longer in existence; some of the former commuter airlines electing to return to commuter airline status, some filing for Chapter 11 bankruptcy, and some being acquired by other carriers through mergers or buyouts.

A number of the new airlines that came into existence during this period were quite successful. Of the 17 new airlines that are still in operation today, four are classified as Nationals (operating revenues of between $100 million and $1.0 billion). Probably the most successful of the new entrants, at least from a traffic standpoint, was People Express, which at one time during its existence (May 1981 to December 1986) ranked as the ninth largest U.S. airline.

CONSOLIDATION OF PRE-DEREGULATION AIRLINES




1978 - CARRIERS
1988 - CARRIERS
ALLEGHENY
CHANGED NAME
USAIR
PACIFIC SOUTHWEST
PIEDMONT
BRANIFF
BANKRUPTCY
"NEW" BRANIFF
BRANIFF
FLORIDA EXPRESS
AIR MIDWEST
BEGAN OPERATIONS AS PART 135 CARRIER
AIR NEW ENGLAND
BANKRUPTCY
ALASKA
ALASKA
JET AMERICA
HORIZON AIR
KODIAK
BEGAN OPERATIONS AS PART 135 CARRIER
MUNZ
BEGAN OPERATIONS AS PART 135 CARRIER
REEVE
REEVE
WEIN AIR
BANKRUPTCY
ALOHA
ALOHA
HAWAIIAN
HAWAIIAN
ASPEN
ASPEN
WRIGHT
BEGAN OPERATIONS AS PART 135 CARRIER

Emergence of the new carriers eroded the pre-deregulation carrier's share of traffic for seven of the 10 years. In 1978, the 11 trunks accounted for 93.7 percent of industry traffic. By the end of 1985, the former trunks' share of industry traffic had shrunk to 77.0 percent. It soon became evident to the larger carriers that the only way to compete with the smaller "upstart" carriers by exploiting its one clear-cut advantage--size. The larger carriers with larger fleets were able to to develop route structures which provided frequent service to most of the major markets in the United States. They were also able to selectively enter into fare competition in those markets where new carriers were attempting to establish new service. This set the stage for the next phase of the deregulation process.

Consolidation Phase

The consolidation phase started in 1979 with the merger of Southern and North Central Airlines to form Republic Airlines. Over the next 9 years, a total of 16 mergers took place, 13 of them occurring since the January 1986. Also since January 1986, we have witnessed the buyout of 16 smaller regional/commuter airlines by the larger commercial air carriers.

Several of the approved mergers had the potential to limit competition at several large hub airports. This potential exists in the case in the Northwest/Republic and the Trans World/Ozark mergers where the merging carriers were the two largest competitors at the Minneapolis/St. Paul, Detroit, and St. Louis airports. Operations at all of these airports have, in fact, declined since 1986. At the end of fiscal year 1988, the number of air carrier operations was down 4.4 percent at St. Louis International Airport, down 6.3 percent at Detroit Metropolitan Wayne Airport, and down 23.6 percent at Minneapolis/St. Paul International Airport.

Concentration Phase

Critics of industry consolidation have expressed concern that deregulation would lead to the control of the industry by a few large carriers. In fiscal year 1988, the combined traffic of the four largest entities (Texas Air Corporation, United, American, and Delta) accounted for 60.4 percent of the total scheduled passenger miles. This figure is more than 6.0 percentage points higher than the combined share of the four largest carriers (United, American, Trans World, and Pan American) in fiscal year 1978.

The concentration of traffic among a few large carriers has changed the overall structure of the industry. In fiscal year 1988, the Majors accounted for 92.3 percent of scheduled passenger miles, 1.7 percentage points higher than the combined share of these same carriers in 1978. In addition, these larger carriers have extended their influence to Regionals/Commuters through code-sharing agreements, and in 1988, these combined entities accounted for more than 80.0 percent of all air carrier/commuter passenger enplanements. This concentration of traffic among a few large entities could, over time, result in a significantly less competitive industry. A protracted slowdown in the traffic demand, due for example to an economic recession, could result in the bankruptcy or takeover of a number of the financially weaker carriers.

Globalization Phase

A fourth and, conceivably, the final phase of the deregulation process may have begun in December 1987 when United Airlines announced a "marketing merger" with British Airways, whereby the two carriers would begin code-sharing operations in the Seattle-Chicago-London and Denver-Chicago-London markets. In addition, the agreement called for the two carriers to share facilities at the Seattle/Tacoma, Chicago O'Hare, and New York Kennedy airports. Since that time, a number of agreements between U.S. and foreign flag carriers have been proposed and/or put into effect. Most notable among them is the recent agreement between the Texas Air Corporation and Scandinavian Airways (SAS).

What makes these agreements particularly important is the current movement toward deregulation and merger/consolidation among Europe's 21 national carriers. In December 1988, the European Community's transport ministers agreed to start freeing up European skies, a move which could possibly lead to the creation of transnational "megacarriers" inside Europe. The European Common Market is scheduled to be completely deregulated in December 1992. When these factors are considered along with the current U.S./foreign flag agreements, it opens the possibility of the creation of multinational "megacarriers" throughout the world. The U.S. experience with code-sharing agreements has shown that, while the smaller regionals/commuters have benefited from a working relationship with a larger airline, those without such a relationship find it difficult to compete. In future years, the same could hold true for competition in international markets.

In summary, it appears that the commercial airline industry has become more concentrated among fewer carriers than it was before deregulation. Only 17 of the 77 new carriers that began scheduled passenger service during the past decade have survived, and a number of these carriers are in financial trouble. Whether there is more or less competition in the U.S. commercial aviation industry today compared with 10 years ago, is openly debated. There is more competition in some markets, but there is less competition in other markets. How an individual air traveler benefits from the changes that have occurred over the past 10 years, oftimes, is dependent on where one lives and where one wants to fly.

FORECAST ASSUMPTIONS

The baseline forecasts of commercial air carrier traffic and activity over the next 12-year period (1989 to 2000) anticipate that the industry will continue to be affected by the deregulation process for at least the next several years. Although it is impossible to foresee all the changes that will occur, it is highly plausible that the merger/consolidation phase begun in fiscal year 1986 could continue well into the 1990's. It is also probable that a number of smaller Nationals and Regionals, including the few remaining post-deregulation low-cost, low-fare carriers, will cease to exist, either through the merger route or through attrition. It is also possible, although not likely, to posit the emergence of new low-cost airlines seeking to establish a market niche for themselves.

It is believed that the industry will continue to experiment with methods to stimulate travel markets through the use of innovative discount fares and/or other travel incentives. In the short term, commercial air carriers can also be expected to continue to expand their present hub systems as well as to develop new secondary hubs. This, however, could increase the delay and capacity problems currently being experienced at many large U.S. air carrier airports. Additional delay and capacity problems could, in turn, significantly constrain the growth of air carrier traffic in the future.

JET FUEL PRICES

In fiscal year 1988, U.S. commercial airlines paid an average price of $0.562 per gallon for jet fuel, an increase of 8.1 percent over the average price paid in 1987. However, the average price is somewhat misleading. If one compares the average jet fuel prices on a month over month basis, we find that jet fuel prices declined from $0.591 per gallon in September 1987 to $0.508 per gallon in September 1988, a decline of 15.1 percent.

Declining fuel prices do have a positive impact on the profitability of U.S. air carriers. When jet fuel prices reached their peak in the third quarter of 1981, fuel costs accounted for 31.2 percent of total air carrier operating costs. In the third quarter (April - June) of fiscal year 1988, fuel costs accounted for only 14.5 percent of total operating costs. While jet fuel prices are forecast to decline significantly during the early years of the forecast period, the long-term trend is generally upward and, barring any unforeseen major fuel crisis or major new oil discoveries, fuel costs as a percent of total operating costs is expected to increase gradually over the forecast period.

Jet fuel prices are projected to decline by 16.1 percent in 1989 and then increase by 9.9 percent in 1990. Jet fuel prices are forecast to reach $1.018 per gallon in the year 2000, an average annual growth rate of 5.1 percent over the 12-year forecast period. In 'real' (1980-82$) dollars, jet fuel prices are expected to increase at an annual rate of 0.9 percent, from $0.486 per gallon in 1988 to $0.539 per gallon in the year 2000.

Domestic

In fiscal year 1988, U.S. domestic airlines paid an average of $0.551 per gallon for jet fuel, 8.5 percent above the average price paid in 1987. On a month over month basis, however, domestic fuel prices declined by 16.0 percent between September 1987 and September 1988 (from $0.588 to $0.495), thus continuing the roller coaster ride that fuel prices have exhibited since the first world-wide energy crisis in 1973.

Starting from a base of just over $0.115 cents a gallon in 1973, the price of jet fuel, aided by a second world-wide energy crisis in 1981, rose to a peak of $1.052 in May 1981. Over the next 66 months (June 1981 to November 1986), the price of domestic jet fuel declined 60.0 percent to $0.422 per gallon. Starting in December 1986, fuel prices began to move upward. Between November 1986 and November 1987, the price of domestic jet fuel increased 42.4 percent to $0.601 per gallon. However, between November 1987 and September 1988, domestic jet fuel prices fell to $0.495 per gallon, a decline of 17.6 percent.

Domestic fuel prices are forecast to increase by 5.1 percent annually over the 12-year forecast period, 0.9 percent in 'real' terms. However, even with such increases, domestic jet fuel prices are not expected to exceed $1.00 a gallon during the forecast period. The per gallon price of jet fuel is projected to decline to $0.463 in 1989, increase to $0.509 in 1990, and reach $0.999 by the year 2000.

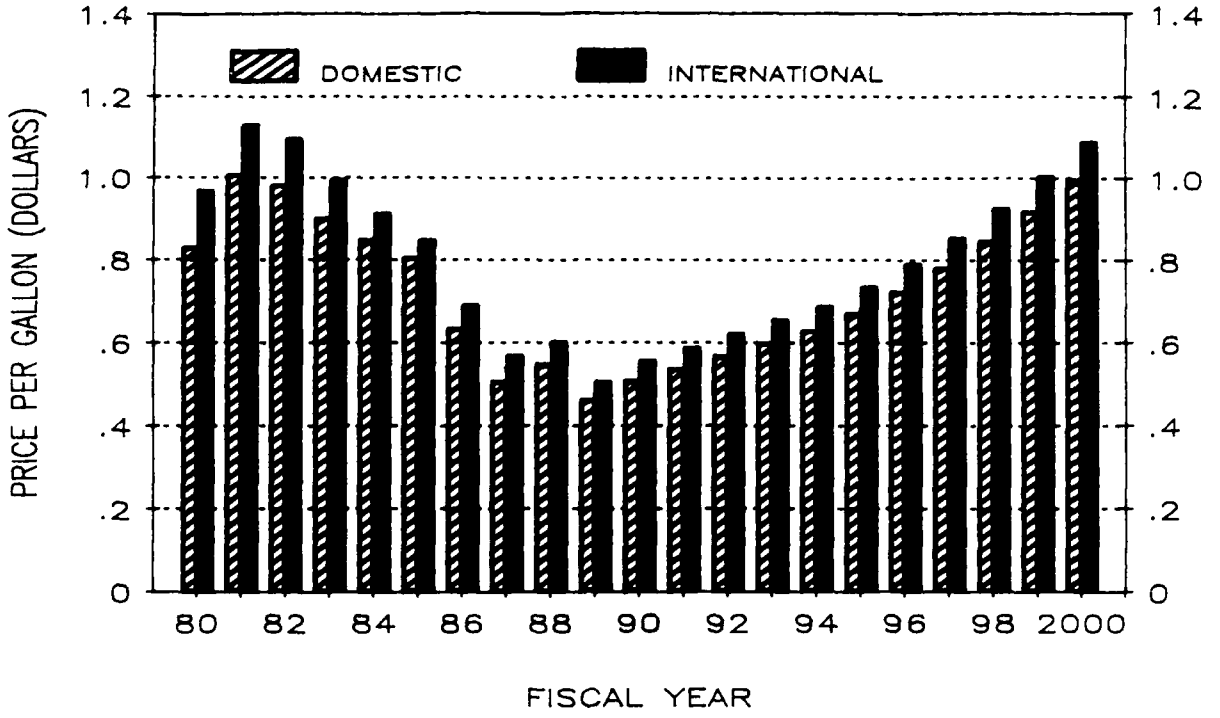
International

International jet fuel prices averaged $0.602 per gallon in 1988, up 5.8 percent from the average 1987 price. However, if we compare the average jet fuel prices on a month over month basis, we find that jet fuel prices declined from $0.631 per gallon in September 1987 to $0.55 per gallon in September 1988, a decline of 12.8 percent.

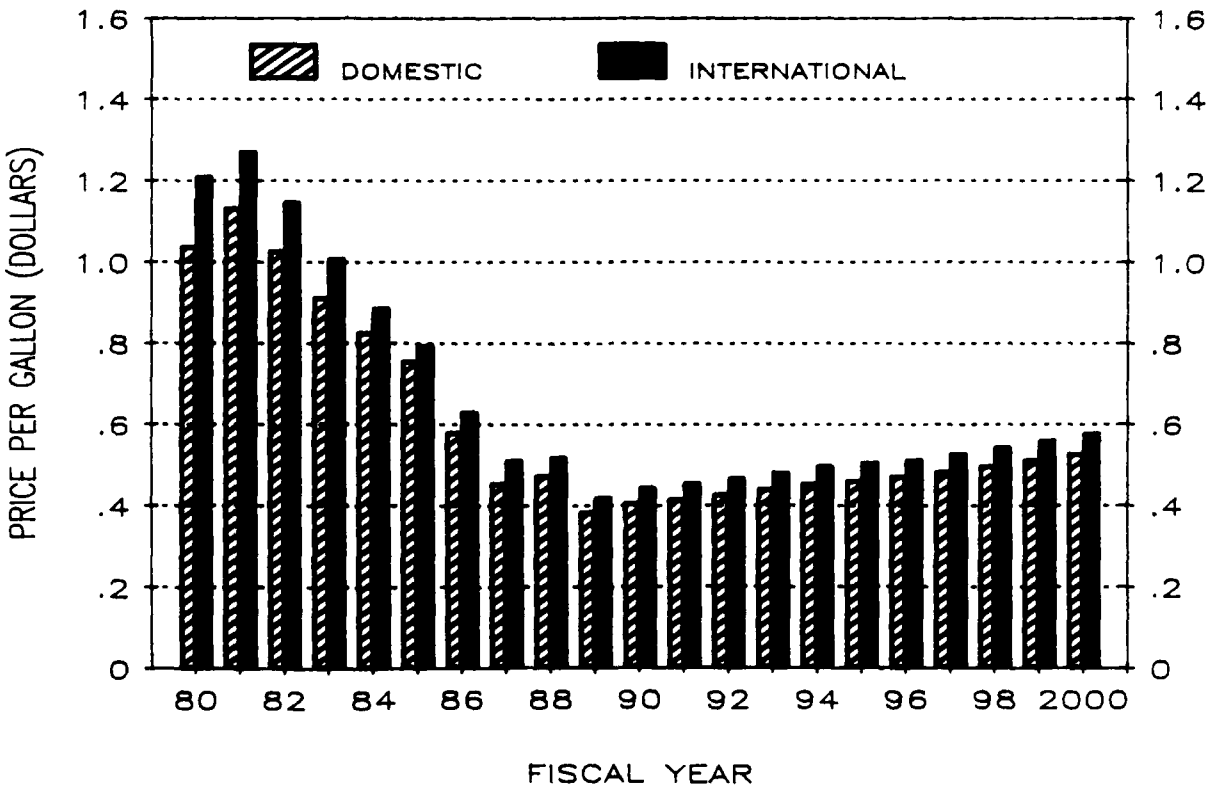
International jet fuel prices peaked at $1.168 per gallon in May 1981. Over the next five and one-half years (May 1981 to November 1986) the price of international jet fuel declined 57.2 percent to $0.499 per gallon. Starting in December 1986, however, international fuel prices began to move upward, peaking at $0.652 per gallon in December 1987. Starting in January 1988, the trend in fuel prices has been downward, falling by 17.5 percent over the next 9 months, reaching a price of $0.55 per gallon in September 1988.

U.S. COMMERCIAL AIR CARRIERS

JET FUEL PRICES - CURRENT DOLLARS



JET FUEL PRICES - 1980-82 DOLLARS



International jet fuel prices are not expected to exceed $1.00 per gallon until 1999. The price of international jet fuel is projected to decline to $0.506 per gallon in 1989, then increase to $0.556 per gallon in 1990, reaching $1.091 per gallon in the year 2000.

PASSENGER YIELDS

After declining by 11.1 percent between 1984 and 1987, passenger yields (revenue per passenger mile) increased by 8.1 percent in fiscal year 1988, from 10.93 cents to 11.81 cents. 'Real' passenger yields (1980-82$) declined by 17.9 percent between 1984 and 1987 but increased by 4.0 percent in 1988, from 9.82 cents in 1987 to 10.21 cents in 1988.

This year's forecast assumes that, despite the uncertain economic outlook over the next several years, there will be no major fare wars to stimulate traffic demand. This is not meant to imply that discount fares will not be available, only that the industry is not expected to resort to the destructive price competition so prevalent during previous slow growth periods. Discount fares should continue to be available in most, if not all, markets. "Yield management" can be expected to play a major role in allocating the number of discount seats available on an individual flight basis. The forecast assumes that the carriers will, as in 1988, opt for higher profits at the expense of slower traffic growth. Of course, a significant downturn in the economy and/or traffic demand could force financially weak carriers to cut fares in order to generate cash flow. In such a scenario, the size of the carrier and the markets it serves would be the determining factor as to whether the other carriers follow suit.

Passenger yields are forecast to increase by 3.6 percent in 1989, 1.9 percent in 1990, and to average 3.3 percent annually over the 12-year forecast period, reaching 17.44 cents in the year 2000. In 'real' terms, yields are projected to decline by almost 0.9 percent annually, averaging 9.23 cents in fiscal year 2000.

Domestic

Domestic passenger yields, after declining on a year-over-year basis for 10 consecutive quarters (fourth quarter 1984 to first quarter 1987), have now increased on a year-over-year basis for six successive quarters, including all four quarters of fiscal year 1988. As a result, the domestic passenger yield increased from 11.20 cents in 1987 to 12.23 cents in 1988 (up 9.2 percent), only the second annual increase in the last seven years. In 'real' dollars, the domestic yield increased by 5.0 percent, from 10.07 cents in 1987 to 10.57 cents in 1988.

Since the end of fiscal year 1988, U.S. airlines have implemented a number of across-the-board fare increases and have also attempted to restrict the use of discount fares by business travelers by restructuring their discounts. i.e., more restrictions and longer advance purchase requirements. In addition, last year's discount fare leader has become this year's leading advocate of fare increases. Domestic fares will probably increase only moderately over the next several years. This is due to the projected decline in fuel prices in 1989 and the expected productivity increases from airline labor.

Domestic passenger yields are projected to increase to 12.75 cents (up 4.3 percent) in 1989 and to 12.96 cents (up 1.6 percent) in 1990. Domestic yield increases are expected to average 3.4 percent annually over the 12-year forecast period, reaching 18.34 cents in the year 2000. In 'real' terms, domestic yields are forecast to decline to 9.71 cents in 2000, an annual rate of decline of 0.7 percent.

International

Unlike domestic yields, international yields have increased in all but two (1984 and 1985) of the last 10 years. Over the last 3 years, international yields have increased by 9.9 percent, from 9.34 cents in 1985 to 10.31 cents in 1988. More than half of this increase (5.6 percent), however, occurred in fiscal year 1988. In 'real' dollars, international yields increased by 1.5 percent in 1988, but by only 1.8 percent over the last 3 years.

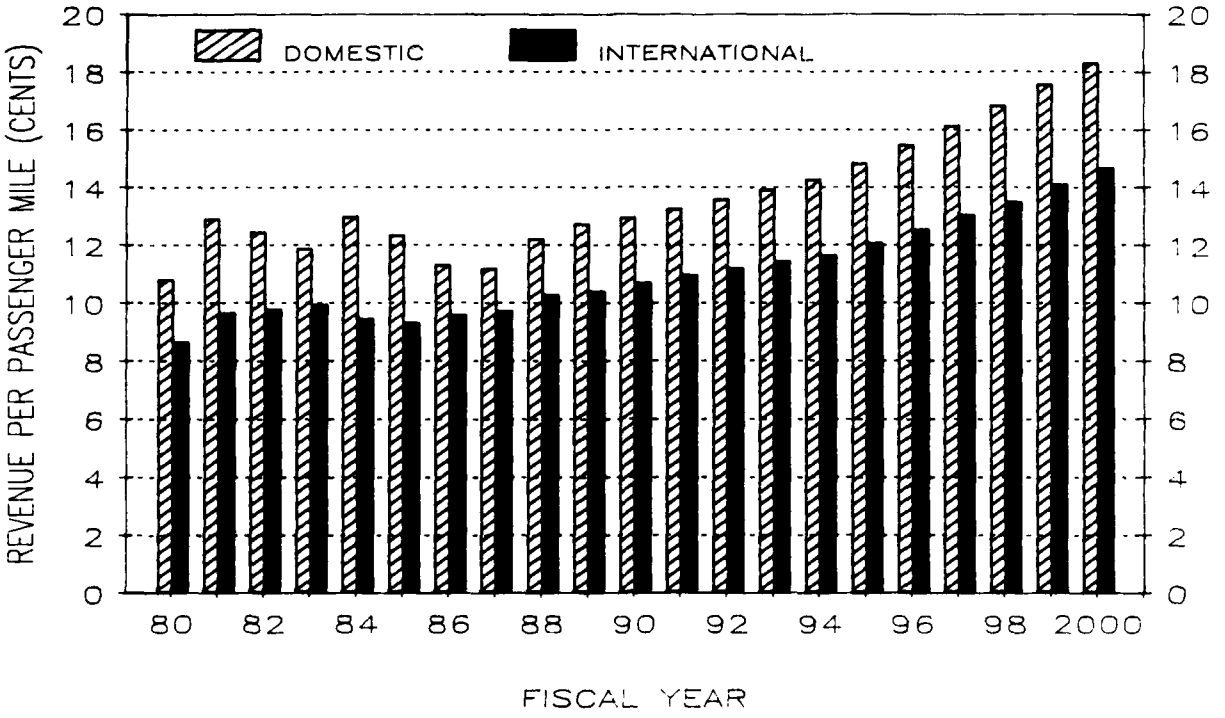
International yields are projected to increase by 1.2 percent in 1989 and 2.9 percent in 1990. Over the 12-year forecast period, international yields are expected to increase at an annual rate of 3.0 percent, reaching 14.70 cents by the year 2000. In 'real' dollars, passenger yields are forecast to decline by just over 1.1 percent annually, from 8.91 cents in 1988 to 7.78 cents in the year 2000.

Atlantic Routes

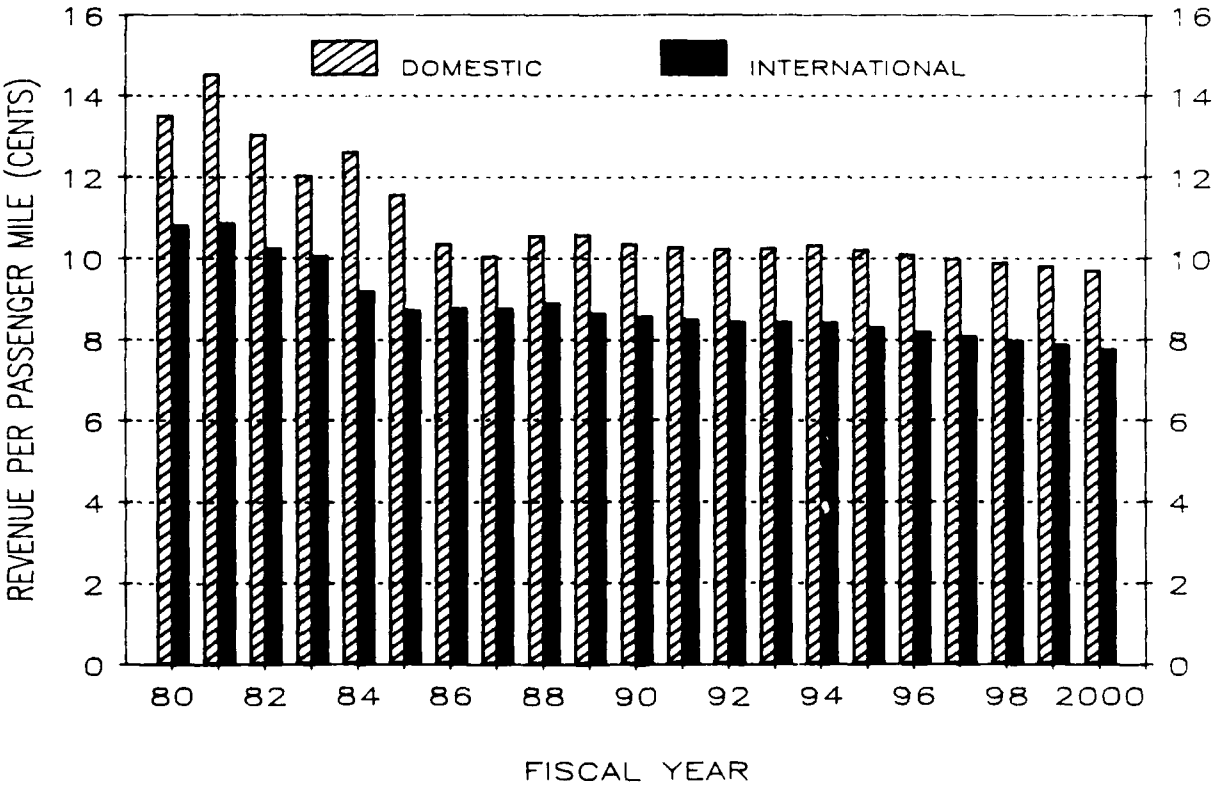
Passenger yields on the Atlantic routes averaged 9.31 cents in fiscal year 1988, 3.6 percent above the 1987 fare level. In 'real' dollars, the Atlantic yield averaged 8.05 cents in 1988, a decline of 0.5 percent. Passenger yields on the Atlantic routes are projected to increase by only 0.7 percent in 1989, declining by 3.2 percent in 'real' terms. Atlantic route yields are forecast to reach 13.22 cents by the year 2000, an average annual increase of 3.0 percent. In 'real' terms, Atlantic yields are expected to decline to 7.00 cents in by the year 2000, an annual rate of decline of 1.2 percent.

U.S. COMMERCIAL AIR CARRIERS

PASSENGER YIELD - CURRENT DOLLARS



PASSENGER YIELD - 1980-82 DOLLARS



Latin American Routes

Passenger yields on the Latin American routes (11.35 cents) increased by 1.1 percent in fiscal year 1988, declining 2.9 percent in 'real' dollars. Over the next 12-year period, Latin American passenger yields are forecast to increase at an annual rate of 3.0 percent, averaging 16.23 cents in fiscal year 2000. Yields are projected to decline by 1.1 percent annually in 'real' dollars, from 9.81 cents in 1988 to 8.59 cents in the year 2000.

Pacific Routes

Passenger yields on the Pacific routes increased by 12.0 percent in fiscal year 1988, 7.7 percent in 'real' terms. Pacific yields are expected to grow at an average annual rate of 2.7 percent between 1988 and 2000, from 11.47 cents to 15.75 cents. In 'real' dollars, passenger yields are forecast to decline from 9.91 cents in 1988 to 8.34 cents in the year 2000, a 1.5 percent annual rate of decline.

PASSENGER TRIP LENGTH

The average passenger trip length (927.8 miles) has increased by 53 mile during the past 2 years, up 33 miles in fiscal year 1988 alone. The average trip length is forecast to increase by almost 5 miles annually over the 12-year forecast period, reaching 986 miles by the year 2000.

It should be noted, however, that there are likely to be large swings around the trend line. The movement in any one year will depend on the discount fare policies adopted by U.S. air carriers and by the mix of business/ vacation travelers.

Domestic

The domestic passenger trip length increased by over 10 miles in fiscal 1988. Over the past 3 years, the domestic passenger trip length has increased by over 27 miles, growing from 758.6 miles in fiscal 1985 to 785.9 miles in fiscal year 1988. We believe that the large increases over the past several years reflect, in part, that a higher percentage of the air travel has been for discretionary travel, as opposed to business travel. This is based on the assumption that discretionary travel, on the average, tends to be of greater distances than business travel. The larger than expected growth in domestic passenger demand (enplanements) in both 1986 and 1987 (up 10.0 and 7.8 percent, respectively) and the subsequent increase in trip length (up 7.5 and 11.3 miles, respectively) would appear to substantiate this contention.

Using this hypothesis to explain the 1988 activity changes (enplanements down 0.3 percent and trip length up 10.5 miles), one could theorize that it was the business traveler, rather than the vacation or discretionary traveler, that caused the decline in domestic passenger demand in 1988. It could mean that the business traveler, whose ticket costs we believe to have increased significantly more than the 8.2 percent increase in the average yield in 1988, could be sensitive to fare increases. Thus, the announced travel restrictions imposed on discount fares since the end of fiscal year 1988, aimed primarily at business travel (under the assumption that business travel will continue no matter what the cost), could have unexpected consequences for U.S. airlines.

The uncertain economic outlook over the next several years may have a greater impact on longer haul, discretionary or vacation trips, than on business trips. Therefore, the domestic trip length is forecast to grow by just over 2 miles during the next 2 years. Beginning in 1991, however, the passenger trip length is expected to increase at a slightly faster rate, although somewhat less than the long-term historical average of 4 to 5 miles a year. The domestic passenger trip length is projected to increase at an average of just over 2 miles annually between 1988 and 2000, increasing to 812 miles by the year 2000.

International

The average international passenger trip length increased by almost 58 miles in fiscal year 1988, this following a decline of 66 miles during the previous 2 years. The international passenger trip length was, however, impacted by terrorist activity in European countries during the spring and summer of 1986, distorting the historical data base in both 1986 and 1987.

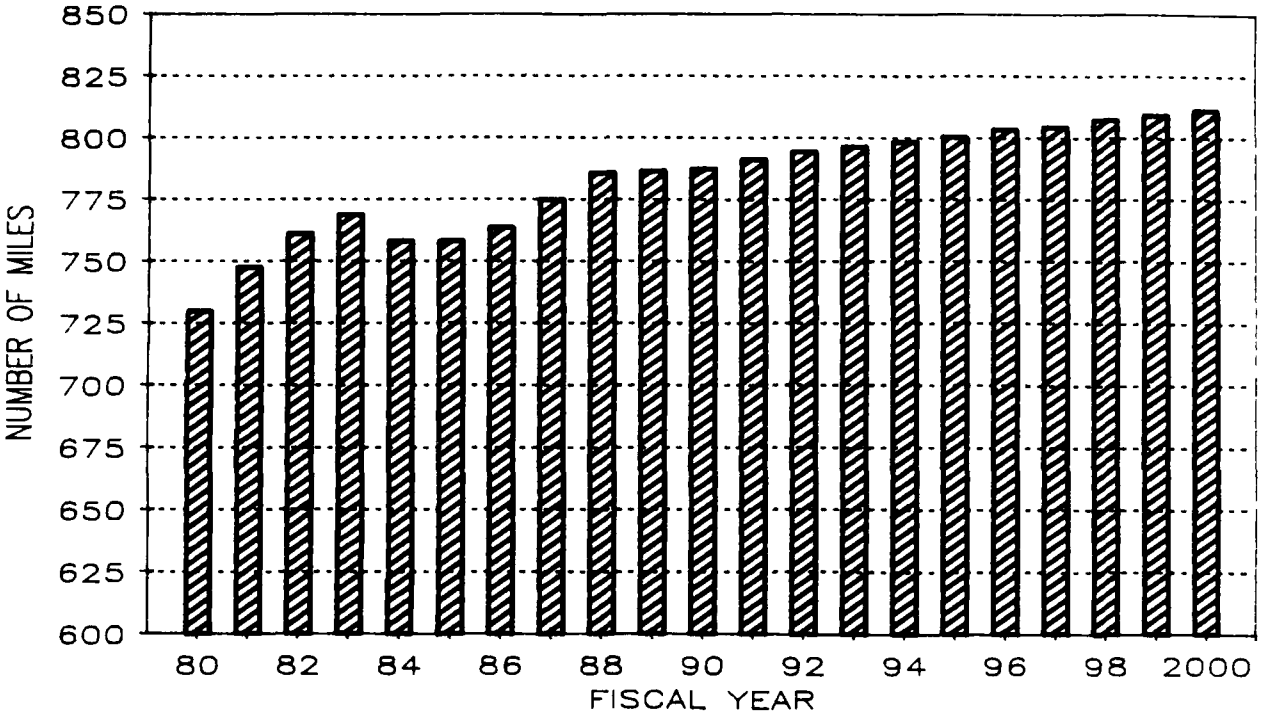
The international trip length is projected to increase by 23 miles in 1989, by 14 miles in 1990, and by an average of 17 miles annually over the 12-year forecast period. Much of the projected increase is due to the fact that travel demand between the United States and the longer distance Pacific destinations is expected to increase at a faster rate than is travel to other international destinations. The average international passenger trip length is expected to increase from 2,644 miles in 1988 to 2,851 miles by the year 2000.

Atlantic Routes

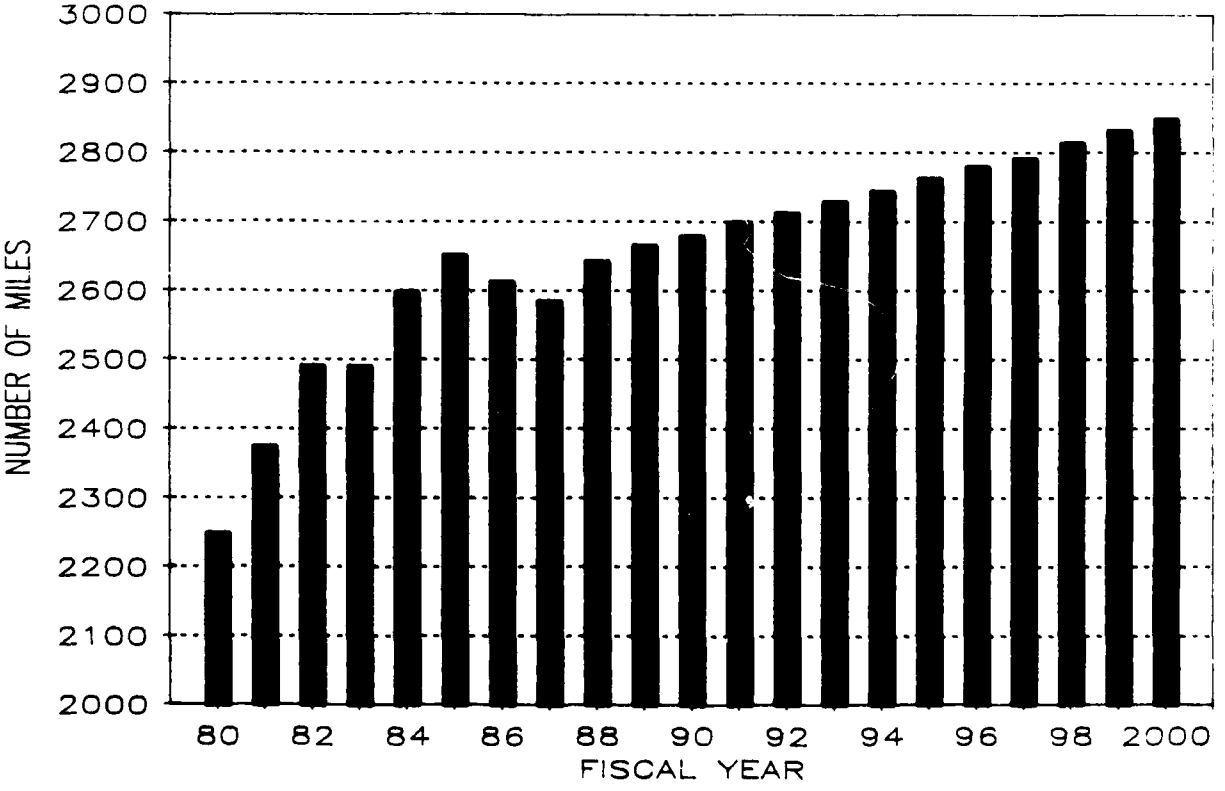
The passenger trip length on the Atlantic routes increased by almost 58 miles in fiscal year 1988. The large one-year increase is due, in part, to the disruptions that took place during much of 1986, thereby distorting the overall data base in both 1986 and 1987. Part of the increase, however, is the result of the increased utilization of widebody twins on the Atlantic routes. These increases result from overflying established international gateways and from increased service between interior U.S. airports and interior European airports.

U.S. COMMERCIAL AIR CARRIERS

PASSENGER TRIP LENGTH - DOMESTIC OPERATIONS



PASSENGER TRIP LENGTH - INTERNATIONAL OPERATIONS



The Atlantic passenger trip length is forecast to increase by 7 miles in 1989 and to increase by 5 miles annually over the forecast period, from 3,163 miles in 1988 to 3,225 miles in the year 2000.

Latin American Routes

The Latin American average passenger trip length declined by almost 14 miles in fiscal year 1988, by almost 59 miles over the past 2 years. These decreases in the passenger trip length are due largely to an increase in service to many of the shorter distance Caribbean and Mexican destinations. The Latin American passenger trip length is projected to decline by almost 4 miles in 1989 and then remain constant in 1990 before resuming an upward trend in 1991. Over the 12-year forecast period, the Latin American passenger trip length is forecast to increase by a total of 46 miles, from 1,239 miles in 1988 to 1,285 miles in the year 2000.

Pacific Routes

The average passenger trip length on the Pacific routes has declined by almost 60 miles over the past 2 years, by 18 miles in fiscal year 1988. The Pacific routes average passenger trip length is expected to increase by an average of 5 miles annually over the forecast period, from 3,691 miles in 1988 to 3,750 miles in the year 2000.

AVERAGE AIRCRAFT SIZE

Between 1978 and 1983, the average seating capacity of aircraft utilized by U.S. commercial air carriers increased by almost 20 seats (from 147.2 to 167.1 seats). Since 1983, however, the average seating capacity of the U.S. fleet has grown by just over one seat. A number of factors are responsible for this lack of growth in the average seating capacity of the U.S. airline fleet, most notably, deregulation, declining fuel prices, and the continued expansion of hub-and-spoke route systems. The increased emphasis on airport hubbing greatly increased the importance of higher frequencies and led to a large increase in the number of small narrowbody aircraft in the U.S. fleet. Declining fuel costs have allowed U.S. airlines to forego the retirement of large numbers of the older, less fuel efficient, stage-2 aircraft (B-727, DC-9, BAC-111, F-28). Another factor, which has significantly affected international operations over the past several years, is the increased utilization of the smaller capacity widebody twins on many European routes.

The uncertainty regarding the U.S. economy and its subsequent impact on passenger demand over the next several years could lead to the sale or grounding of a number of the smaller capacity stage-2 aircraft. This, added to the fact that the aircraft now being delivered to the U.S. fleet are generally larger than the ones being replaced, should result in an increase in the average seating capacity of the air carrier fleet throughout the forecast period, although at a rate somewhat less than the average long-term historical trend of three to four seats per year. The forecast assumes that the average seating capacity of the U.S. commercial airline fleet will increase by an average of between two and three seats annually over the forecast period. In the year 2000, U.S. air carrier aircraft are expected to average 199 seats, up from 168 seats in 1988.

Domestic

Between 1978 and 1983, the average seating capacity of an aircraft in domestic service increased by just over 17 seats, from 136.4 to 153.6 seats. Since 1983, however, the average seating capacity of domestic aircraft has actually declined by more than half a seat, to 153.0 seats in fiscal year 1988. The continued expansion of the hub-and-spoke route systems and the retention of older stage-2 aircraft are two of the primary reasons for the lack of growth since 1983 in the average seating capacity of the domestic fleet.

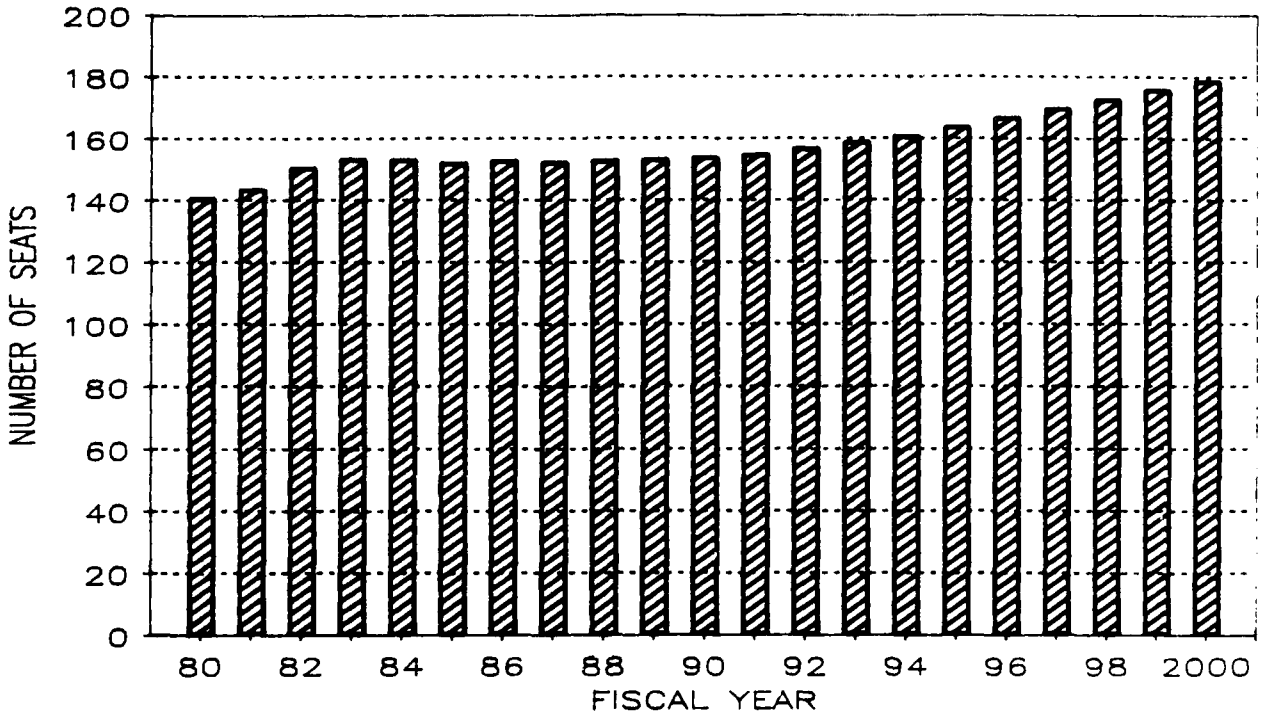
This forecast assumes only a small increase in the average seating capacity of domestic aircraft over the next several years, up two seats between 1988 and 1991. Thereafter, however, the average seating capacity of domestic aircraft is expected to increase between two and three seats annually throughout the remainder of the forecast period. Over the 12-year forecast period, the average seating capacity of aircraft utilized in domestic service is forecast to increase by 16 seats, from 153 seats in 1988 to 179 seats in the year 2000.

International

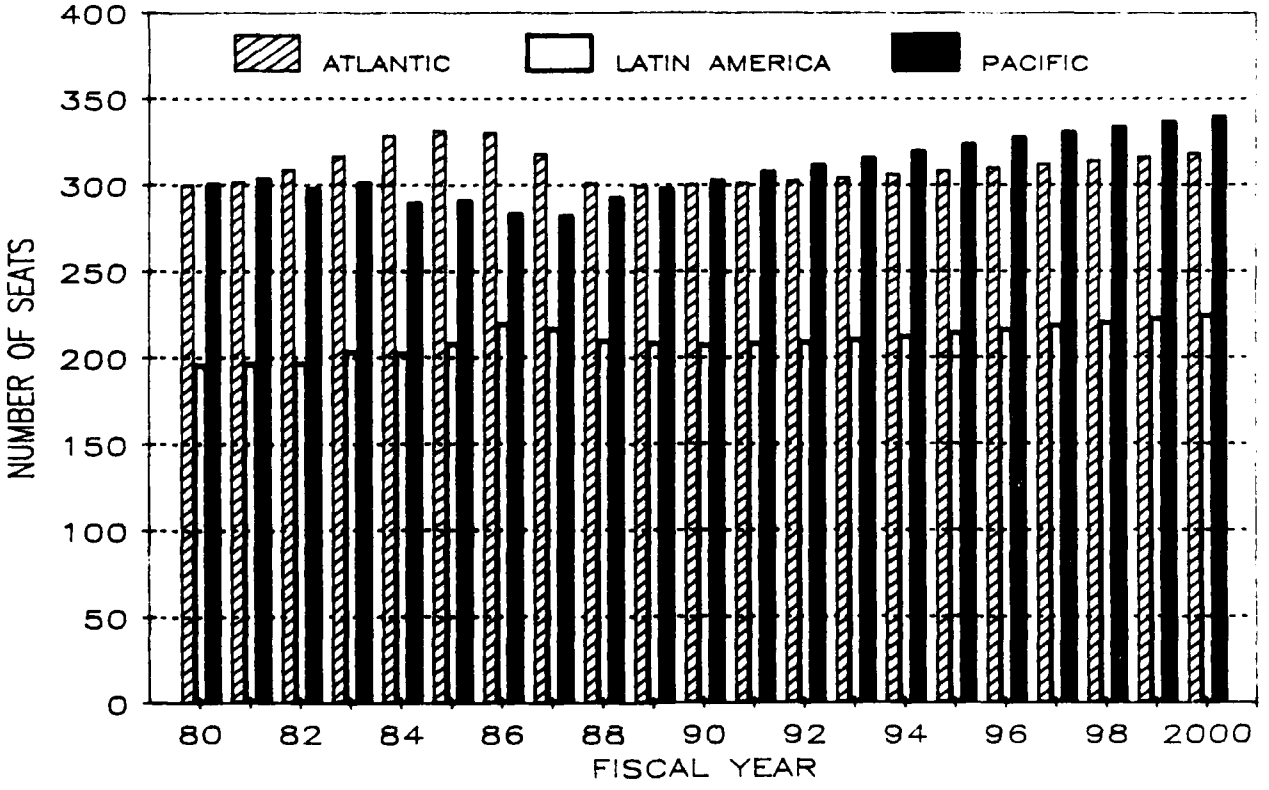
The average seating capacity of an aircraft in international service has declined by over 13 seats since 1985, largely the result of the increased utilization of the smaller B-767 and A-310 aircraft across the Atlantic. This forecast assumes that this trend will continue for at least the next several years, but that the overall impact will be blunted somewhat by the expanded utilization of the larger B-747-400 aircraft on the Pacific routes. The average seating capacity of aircraft in international service is expected to increase by only one seat in 1989 but is forecast to increase by an average of almost three seats annually throughout the remainder of the forecast period. In the year 2000, aircraft in international service are forecast to average 310 seats, up from 279 seats in 1988.

U.S. COMMERCIAL AIR CARRIERS

AVERAGE SEATS PER AIRCRAFT - DOMESTIC OPERATIONS



AVERAGE SEATS PER AIRCRAFT - INTERNATIONAL OPERATIONS



Atlantic Routes

The increased use of widebody twins has reduced the average seating capacity of aircraft on the Atlantic routes by 29 seats over the past 2 years, by over 17 seats in fiscal year 1988 alone. This forecast assumes this trend will continue for several additional years, but at a significantly slower pace than has been the experience over the last 2 years. This is primarily due to the congested airspace over much of Europe and the fact that all aircraft enroute to or from European destinations must fly through the same oceanic centers, even if they are overflying the congested airports.

The seating capacity of aircraft used on the Atlantic routes is forecast to decline by an additional two seats in 1989 but is expected to increase by an average of just under two seats annually over the remainder of the forecast period, from 302 seats in 1988 to 319 seats by the year 2000.

Latin American Routes

The average seating capacity of aircraft on the Latin American routes has declined by almost 10 seats over the past 2 years, by seven seats in fiscal year 1988. This forecast assumes that this downward trend will continue for the next two years, with the average aircraft size declining from 210 seats in 1988 to 208 seats in 1990. Thereafter, the average seating capacity of aircraft operating on the Latin American routes is expected to increase between one and two seats annually, reaching 225 seats by the year 2000.

Pacific Routes

Aircraft on Pacific routes averaged 293 seats in fiscal year 1988, an increase of 10 seats over the average aircraft size in 1987. Because of the extensive re-equipment programs (B-747-200 and MD-11 aircraft) of the carriers now operating on the Pacific routes, this forecast assumes that the average seating capacity of aircraft operating across the Pacific will increase by between four and five seats a year between 1988 and 1996, then slow to three seats annually for the remainder of the forecast. Over the entire forecast period, the average seating capacity of an aircraft operating between the United States and Pacific destinations is projected to increase by 47 seats, reaching 340 seats in the year 2000.

LOAD FACTOR

In fiscal year 1988, U.S. scheduled air carriers recorded a load factor of 62.2 percent, only 0.1 point lower than achieved in 1987. Based on projected levels of capacity and traffic, the system load factor is expected to increase only slightly over the next 2 years (to 62.5 percent in 1990), then increase at a somewhat faster pace over the remainder of the forecast period. System load factors in the year 2000 are expected to average 65.8 percent, up 3.6 points over the 1988 load factor.

Domestic

Domestic load factors averaged 61.0 percent in fiscal year 1988, 0.7 points below the 1987 load factor. The uncertainty of the U.S. economic outlook and slower traffic growth over the next several years should result in only slight increases in the domestic load factor in 1989 and 1990. However, the domestic load factor is expected to increase gradually to 65.1 percent by the year 2000, an increase of 4.1 points over the load factor achieved in 1988.

International

U.S. scheduled air carriers recorded the highest international load factor in modern times in fiscal year 1988 (66.9 percent), 2.3 points higher than the 1987 load factor and 0.8 points higher than the previous high set in 1984. The large increases projected in international capacity over the next several years is expected to result in a slight decline in the international load factor in the short-term. However, load factors are forecast to increase gradually over most of the remainder of the forecast period, reaching a high of 68.1 percent by the year 2000.

Atlantic Routes

Despite a capacity increase of almost 20.0 percent on the Atlantic routes in fiscal year 1988, U.S. air carriers achieved a 65.8 percent load factor, 0.5 points higher than the 1987 load factor. Load factors are expected to decline slightly during the first 2 years of the forecast period (65.3 percent in 1990), then increase slightly throughout the rest of the forecast period. The projected load factor on the Atlantic routes in the year 2000 is 68.1 percent, 2.3 points higher than the 1988 load factor.

Latin American Routes

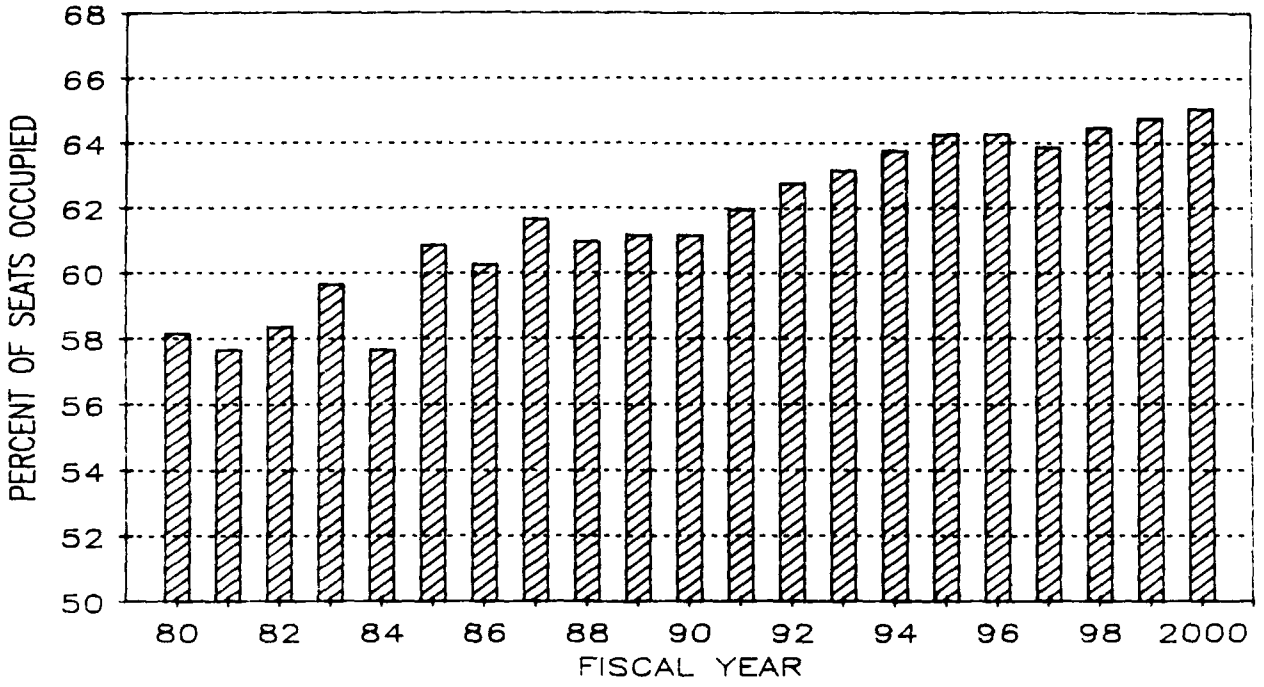
U.S. scheduled airlines achieved a 62.5 percent load factor on the Latin American routes in fiscal year 1988, an increase of 3.2 points over the load factor achieved in 1987. Latin American load factors are forecast to increase only slightly over the 12-year forecast period, reaching a high of 64.8 percent in 2000, an increase of 2.3 points over the 1988 load factor.

Pacific Routes

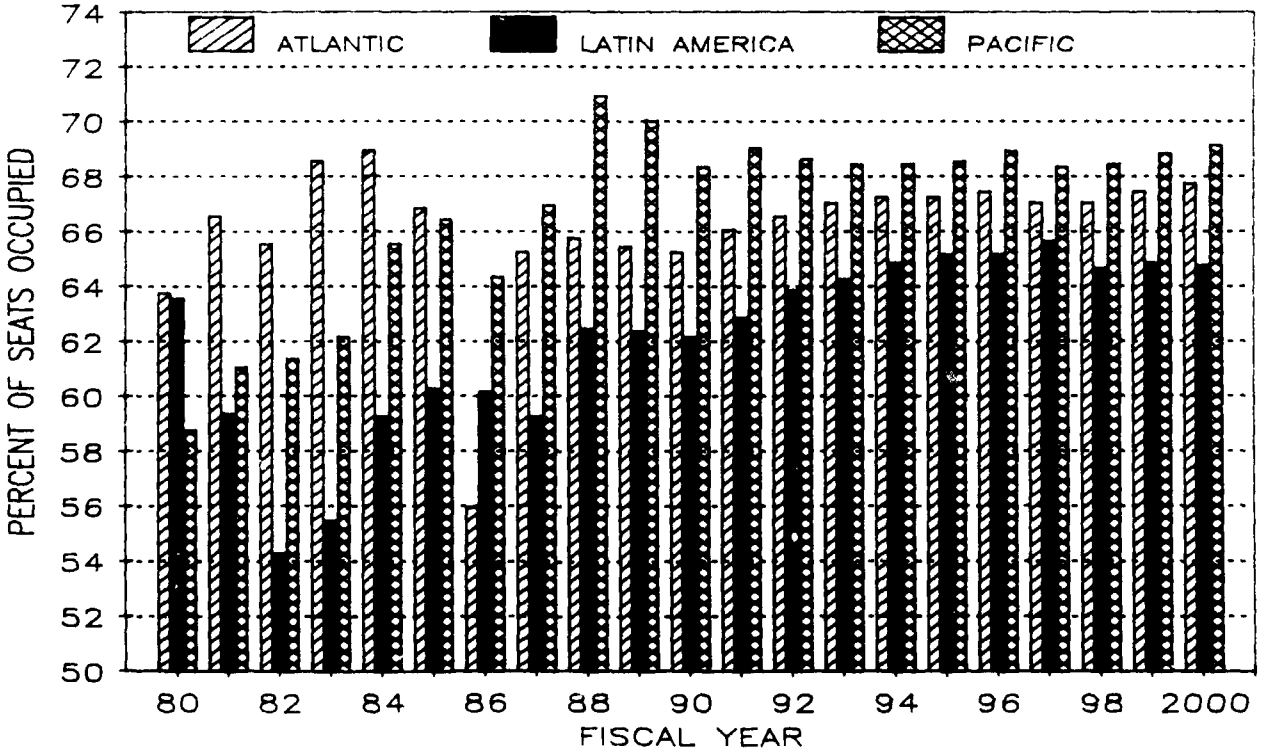
Despite capacity increases of 35.1 percent on the Pacific routes since 1986, U.S. carriers achieved an all-time high load factor of 71.0 percent in fiscal year 1988, 6.6 points higher than the 1986 load factor. Because of the projected large capacity increases on Pacific routes, load factors are expected to decline by almost two points over the 12-year forecast period. Load factors on the Pacific routes are expected to average 69.2 percent in the year 2000.

U.S. COMMERCIAL AIR CARRIERS

PASSENGER LOAD FACTOR - DOMESTIC OPERATIONS



PASSENGER LOAD FACTOR - INTERNATIONAL OPERATIONS



AIR CARRIER FORECASTS

The recent downing of Pan American Flight 103 has renewed the concerns regarding terrorist activity and airline passenger safety. That event will, no doubt, have some impact on passenger demand. Barring further such disturbances, however, the impact on overall traffic demand and peak summer travel to European destinations is expected to be negligible. Should other disturbances occur, however, passenger demand will likely follow the same path as in 1986, with severe disruptions in travel to potential trouble spots and a shift in passenger preferences from these destinations to other international and domestic destinations. In addition, the experience of 1986 has taught us that pent-up demand caused by such disruptions will be realized in future years. Therefore, any impact on the long-term domestic and international forecasts presented in this section will be minimal.

REVENUE PASSENGER MILES

U.S. scheduled air carriers recorded a total of 416.0 billion revenue passenger miles in fiscal year 1988. System passenger miles are forecast to increase to 437.1 billion (up 5.1 percent) in 1989 and to 455.4 billion (up 4.2 percent) in 1990. These smaller than average increases are due largely to the uncertainty surrounding both the U.S. and world economic growth over the next several years. Over the 12-year forecast period, system RPM's are projected to increase at an average annual rate of 5.0 percent, reaching 750.4 billion in fiscal year 2000.

Domestic

Domestic passenger miles totaled 325.5 billion in fiscal year 1988. Domestic RPM's are projected to increase to 339.5 billion (up 4.3 percent) in 1989 and to 352.9 billion (up 3.9 percent) in 1990, the slow traffic growth is due to the uncertainty regarding U.S. economic growth over this 2 year time period. Domestic passenger miles are projected to reach a total of 565.0 billion by the year 2000, an average annual growth rate of 4.7 percent over the 12-year forecast period.

International

After experiencing unprecedented growth over the last two years (up 41.6 percent), the demand for international travel is expected to return to a more normal growth environment over the next 12 years. International RPM's are forecast to increase from 90.5 billion in fiscal year 1988 to 97.6 billion in 1989, an increase of 7.8 percent.

However, international traffic is expected to slow considerably in 1990, growing by only 5.0 percent to 102.5 billion RPM's. This slowdown in 1990 is due to the expected slower growth in both the United States and world economies. International RPM's are expected to more than double over the 12-year forecast period, increasing at an average annual rate of 6.1 percent. U.S. scheduled airlines are projected to record a total of 185.4 billion international RPM's in the year 2000.

Atlantic Routes

Traffic growth on the transatlantic routes has averaged over 19.0 percent in each of the past 2 years, with U.S. scheduled airlines recording a total of 46.1 billion revenue passenger miles in fiscal year 1988. Demand is expected to slow considerably over the next 2 years, with RPM's projected to reach 49.1 billion (up 6.4 percent) in 1989 and 51.0 billion (up 3.9 percent) in 1990. Atlantic route RPM's are forecast to increase at an annual rate of 4.7 percent over the entire forecast period, with RPM's totaling 80.9 billion in the year 2000.

Latin American Routes

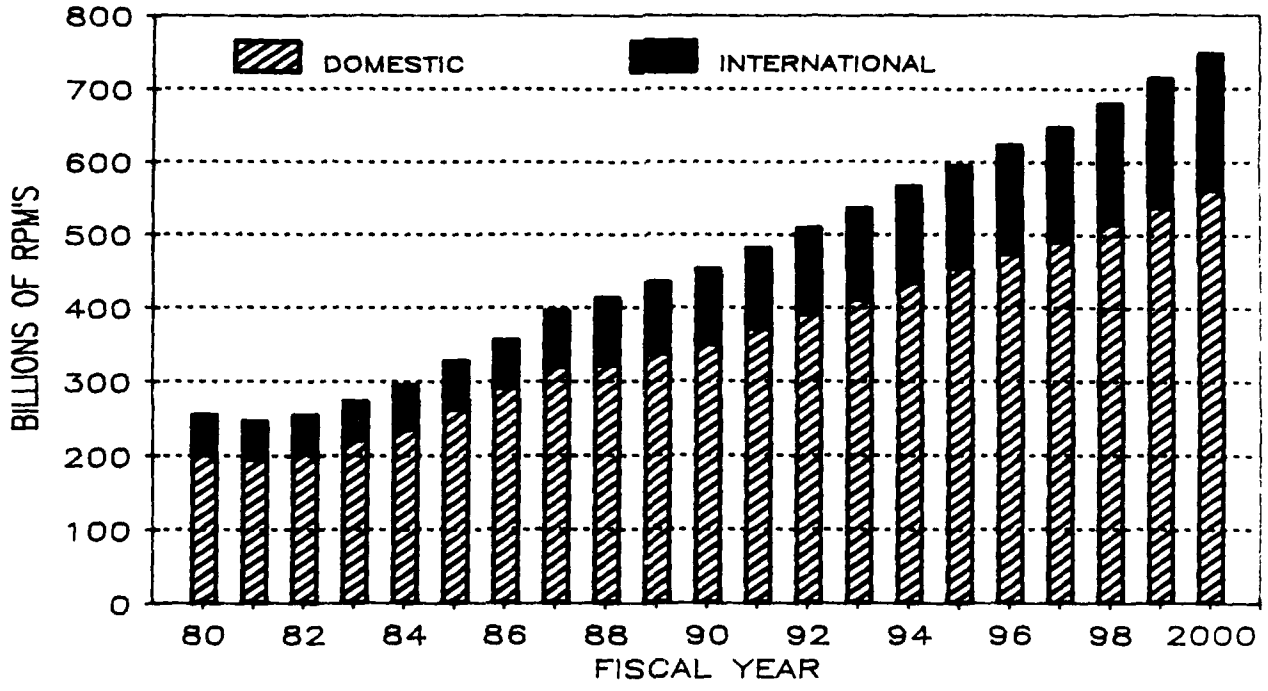
Latin American route RPM's totaled 14.2 billion in fiscal year 1988. Slow growth is also forecast in this region over the next 2 years, due largely to the expected slower economic growth in many of the Latin American countries. Latin American RPM's are forecast to increase by only 4.1 percent in 1989, 3.4 percent in 1990, and to average 4.3 percent annually over the 12-year forecast period. In fiscal year 2000, Latin American RPM's are forecast to total 23.6 billion.

Pacific Routes

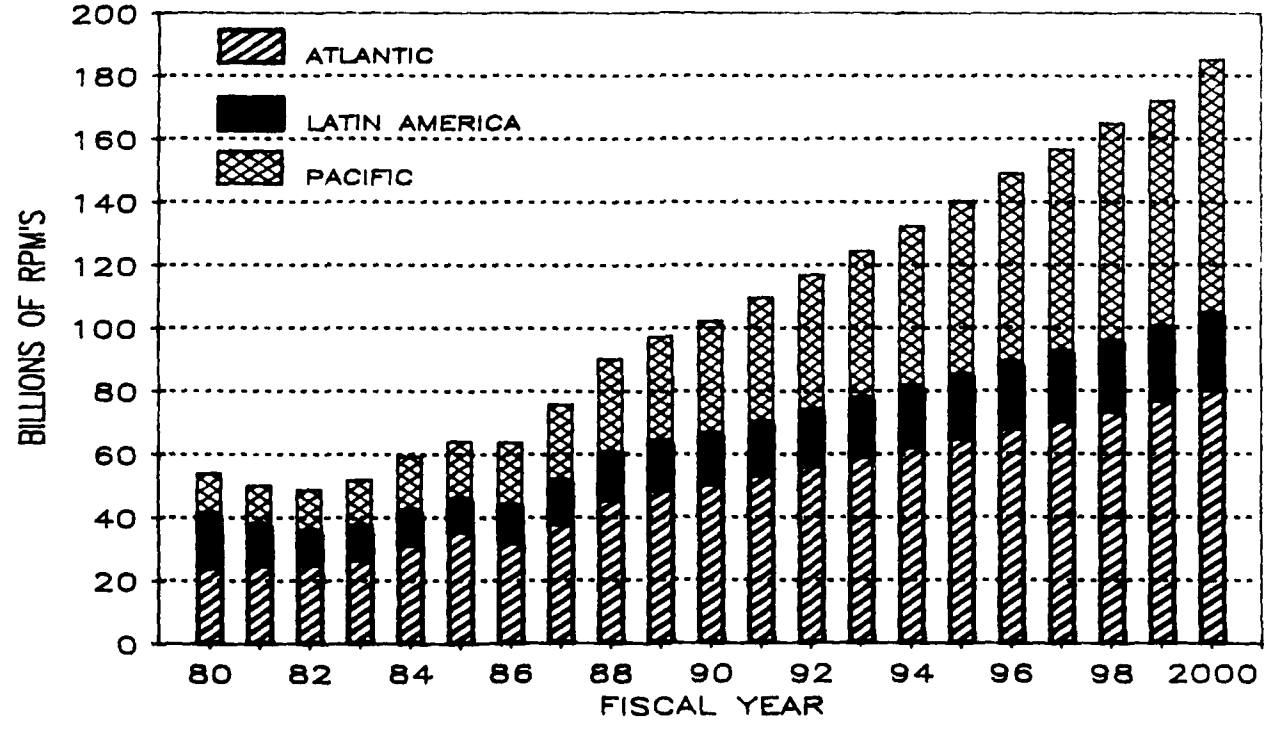
Growth in passenger demand between the United States and the Pacific has averaged over 22.0 percent since 1985, with RPM's totaling 30.2 billion in fiscal year 1988. Passenger demand in the Pacific is expected to continue to exhibit strong growth throughout the entire forecast period, although at considerably lower rates than observed over the past several years. Trans-pacific route RPM's are projected to total 33.7 billion (up 11.6 percent) in 1989, 36.2 billion (up 7.4 percent) in 1990, and 40.0 billion (up 10.5 percent) in 1991. Growth over the 12-year forecast period is expected to average 8.6 percent annually, with RPM's growing to 80.9 billion by the year 2000.

U.S. COMMERCIAL AIR CARRIERS

SCHEDULED DOMESTIC AND INTERNATIONAL RPM'S



SCHEDULED INTERNATIONAL RPM'S BY TRAVEL REGION



PASSENGER ENPLANEMENTS

In fiscal year 1988, U.S. scheduled air carriers enplaned a total of 448.5 million passengers. Both the short-term uncertainty about the U.S. economy and the projected slowdown in world economic growth are expected to slow the demand for air travel over the next several years. System passenger enplanements are forecast to increase to 468.0 million (up 4.4 percent) in 1989 and to 486.1 million (up 3.9 percent) in 1990. Over the 12-year forecast period, system enplanements are projected to increase at an average annual rate of 4.5 percent, totaling 760.8 million passengers in fiscal year 2000.

Domestic

U.S. scheduled domestic air carriers enplaned a total of 414.2 million passengers in fiscal year 1988. Domestic passenger enplanements are forecast to total 431.4 million (up 4.2 percent) in 1989 and 447.8 million (up 3.8 percent) in 1990. The projected growth in domestic enplanements between 1988 and the year 2000 is expected to average 4.4 percent annually, with the number of domestic enplanements expected to reach 695.8 million in the year 2000.

International

A total of 34.2 million passengers were enplaned by U.S. scheduled international air carriers in fiscal year 1988. International enplanements are projected to increase to 36.6 million (up 6.9 percent) in 1989 and to 38.2 million (up 4.5 percent) in 1990. The increase in the number of passenger enplanements is expected to average 5.4 percent annually over the 12-year forecast period. International passenger enplanements are expected to total 65.0 million in the year 2000.

Atlantic Routes

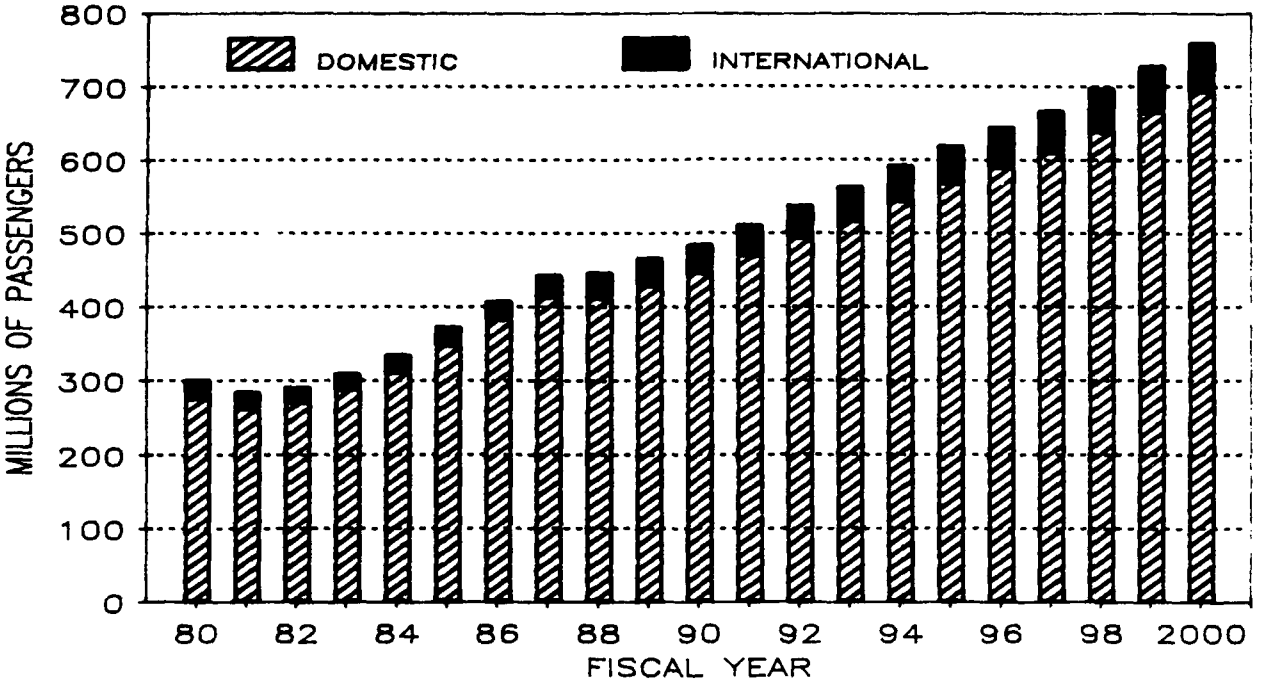
Passenger enplanements on the Atlantic routes totaled 14.6 million in fiscal year 1988. U.S. air carrier passenger enplanements on the transatlantic routes are forecast to reach 15.5 million (up 6.2 percent) in 1989 and 16.1 million (up 3.7 percent) in 1990. The projected annual rate of growth over the 12-year forecast period is 4.5 percent, with passenger enplanements on the Atlantic routes expected to total 25.1 million in fiscal year 2000.

Latin American Routes

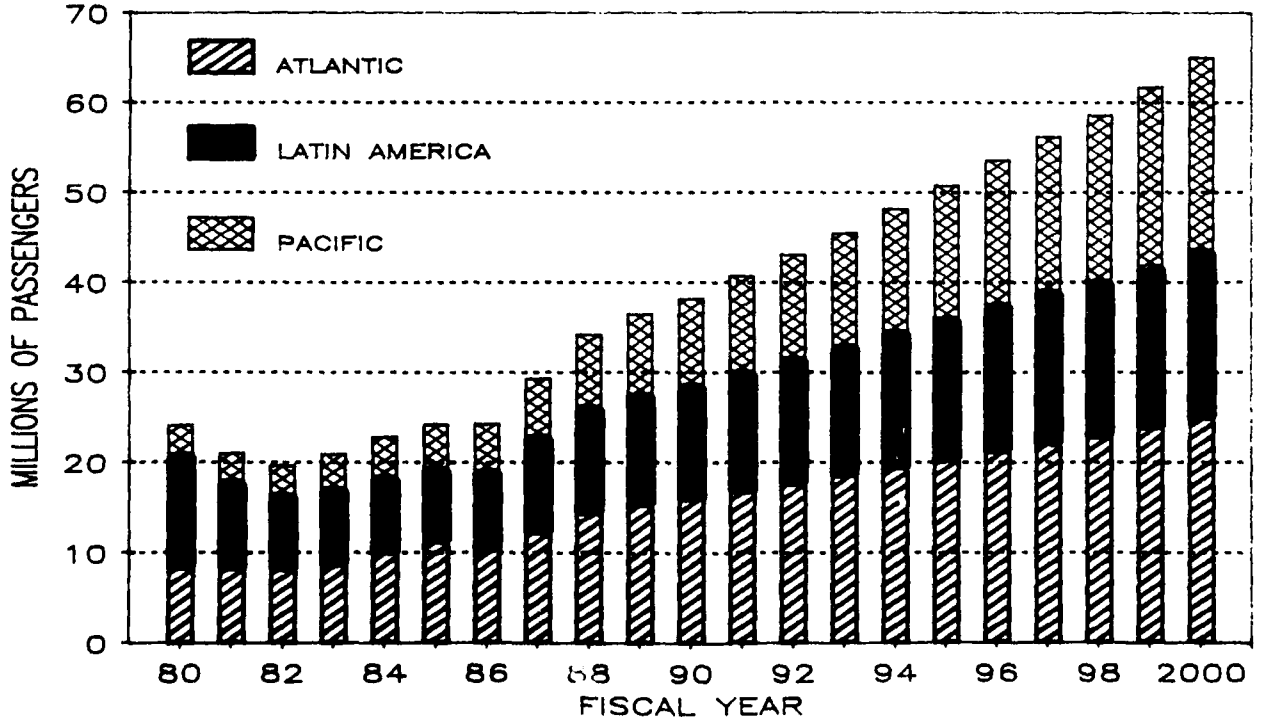
U.S. scheduled airlines operating on the Latin American routes enplaned a total of 11.5 million passengers in fiscal year 1988. The number of passenger enplanements is projected to increase to 12.0 million (up 4.4 percent) in 1989 and to 12.4 million (up 3.4 percent) in 1990. Between 1988 and 2000, the number of enplaned passengers traveling between the United States and Latin American destinations is forecast to increase by 4.0 percent annually, reaching a total of 18.4 million in the year 2000.

U.S. COMMERCIAL AIR CARRIERS

SCHEDULED DOMESTIC AND INTERNATIONAL ENPLANEMENTS



SCHEDULED INTERNATIONAL ENPLANEMENTS BY TRAVEL REGION



Pacific Routes

Passenger enplanements on routes between the U.S. and Pacific destinations totaled 8.2 million in fiscal year 1988. Passenger enplanements are forecast to increase to 9.2 million (up 11.5 percent) in 1989, to 9.8 million (up 7.3 percent) in 1990, and to 10.8 million (up 10.3 percent) in 1991. Over the 12-year forecast period, Pacific route passenger enplanements are projected to increase at an average annual rate of 8.4 percent, totaling 21.6 million in the year 2000.

AIR CARRIER FLEET

Over the past 2 years, a total of 1,605 orders (world-wide) for large jet aircraft were placed with U.S. and foreign aircraft manufacturers; 957 of these orders in fiscal year 1988 alone. Of this 2-year total, 1,175 (73.2 percent) were for two-engine narrowbody (B-737, B-757, MD-80) aircraft. As of September 30, 1988, aircraft manufacturers had a total backlog of 1,995 aircraft on order. Of this total backlog, 1,476 (74.0 percent) are for two-engine narrowbody aircraft.

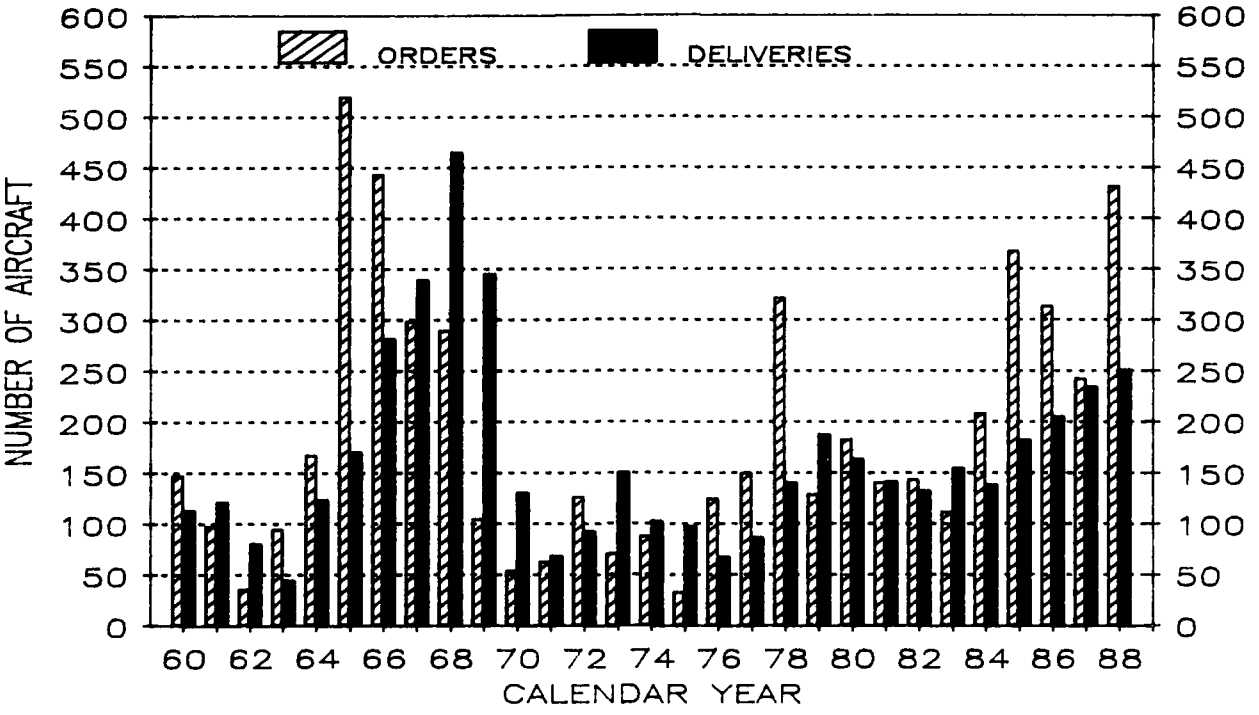
U.S. customers ordered a total of 677 aircraft over the past 2 years; 433 in 1988. Of this 2-year total, 76.2 percent (516 aircraft) were for two-engine narrowbody aircraft.

Also over the past 2 years, aircraft manufacturers delivered a total of 888 jet aircraft world-wide, 477 aircraft in fiscal year 1988 alone. Of this 2-year total, 638 (71.9 percent) were two-engine narrowbody aircraft. Deliveries to U.S. customers totaled 469 over the past 2 years; 253 in 1988. Of this 2-year total, 81.7 percent (383 aircraft) were two-engine narrowbody aircraft. However, the main point is that aircraft deliveries to U.S. customers over the past 2 years were net additions to the U.S. fleet. Very few of the older stage-2 aircraft were retired during this time period. This action has resulted in significant increases in air carrier operations and this has, in turn, put pressure on the Air Traffic Control and the National Airspace System.

At the end of 1988, there were approximately 2,300 stage-2 aircraft in the U.S. air carrier jet fleet. Because of the anticipated slowdown in passenger demand, it is anticipated that U.S. carriers will begin to retire or sell the older stage-2 aircraft. For purposes of this forecast, a 25-year life cycle has been assumed for most stage-2 aircraft, the exception being the B-727-200 aircraft which is a candidate for retrofit. At the end of the 12-year forecast period, it is projected that there will be approximately 960 stage-2 aircraft remaining in the U.S. airline jet fleet.

JET AIRCRAFT ORDERS AND DELIVERIES

U.S. CUSTOMERS



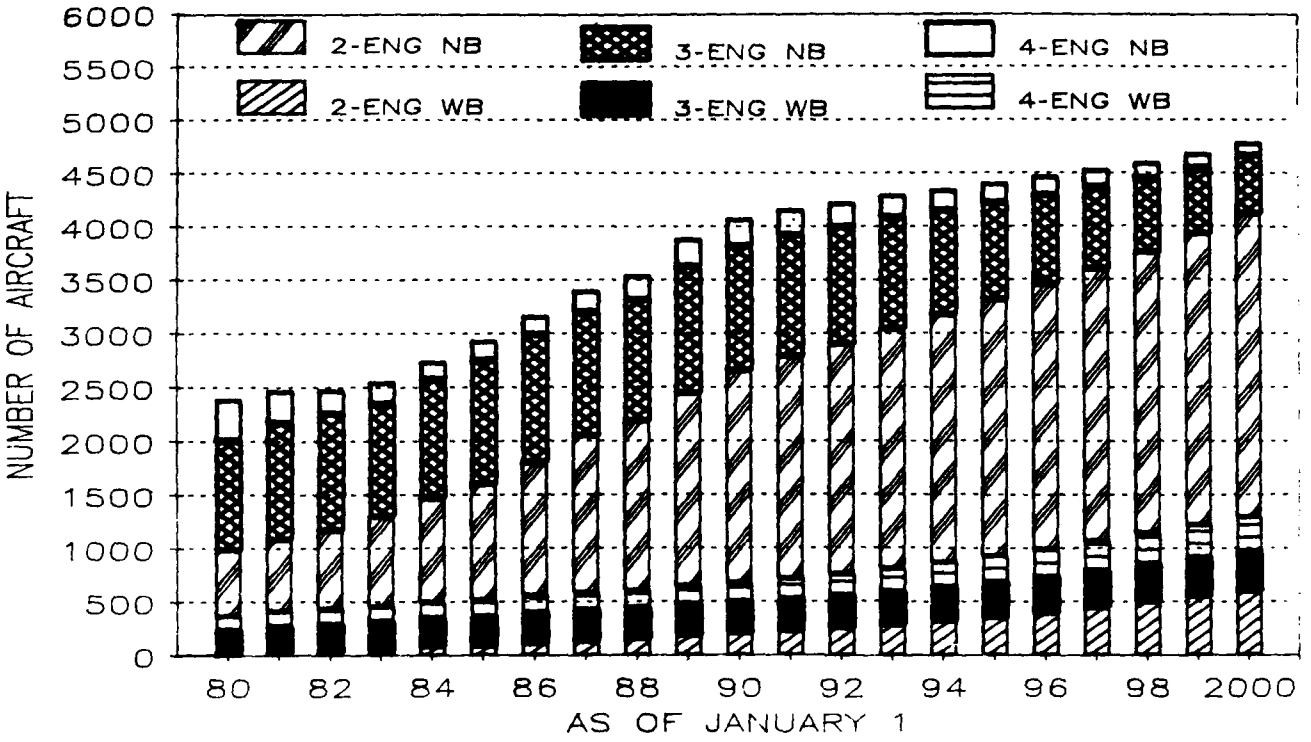
Based on the backlog of aircraft orders and the projections of air carrier traffic, seat capacity, load factors, and fleet retirements, the U.S. commercial air carrier fleet is projected to increase from a total of 3,542 jet aircraft in 1988 to a total of 4,791 aircraft in the year 2000. This amounts to the delivery of almost 222 aircraft annually and results in the net addition of approximately 104 aircraft (2.6 percent) to the U.S. fleet each year. Much of this growth occurs over the next 2 years, when the U.S. fleet is forecast to increase by 531 aircraft, 42.5 percent of the expected increase for the entire 12-year forecast period.

To absorb this expected increase in capacity in 1989 and 1990 and still maintain the high load factors discussed earlier in the forecast assumptions section, significant reductions are assumed in the utilization rates of the older stage-2 aircraft. Of course, the industry could decide to maintain current utilization rates and let load factors decline below 60.0 percent or they could decide to retire additional stage-2 aircraft.

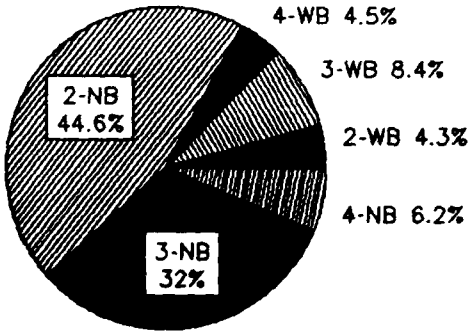
By far the fastest growth occurs in the two-engine narrowbody aircraft category, which is expected to grow by an average of 104 aircraft annually. By the year 2000, two-engine narrowbody aircraft are expected to total 2,822 units and to account for 58.9 percent of the total fleet, up from 44.6 percent in fiscal year 1988. This trend reflects the fact that the continued expansion and development of hub airports increases the importance of higher frequencies and the demand for aircraft with smaller capacities.

U.S. COMMERCIAL AIR CARRIERS

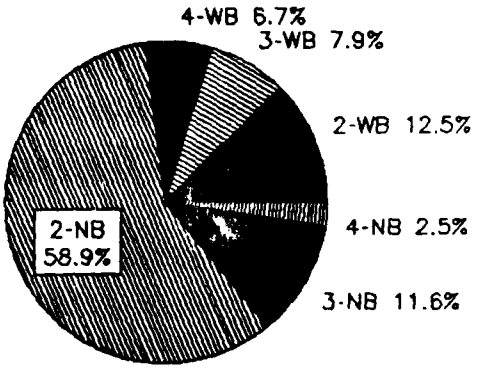
LARGE JET AIRCRAFT



PERCENT BY AIRCRAFT TYPE



1988



2000

Three-engine narrowbody (B-727) aircraft, the mainstay of the air carrier jet fleet during the 1970's and early 1980's, are expected to decline from 1,135 aircraft in 1988 to only 554 aircraft in the year 2000. The number of four-engine narrowbody (DC-8 and BA-146) aircraft is also expected to decline in absolute numbers over the forecast period, from 221 in 1988 to 118 in the year 2000.

Widebody aircraft, which accounted for only 17.2 percent of the fleet in fiscal year 1988, are expected to account for 27.1 percent of the U.S. air carrier large jet fleet by the year 2000. Two-engine widebody (A-300, A-310, and B-767) aircraft, the fastest growing of the widebody groupings, are expected to increase by an average of approximately 37 aircraft annually, from 153 aircraft in 1988 to 599 aircraft in the year 2000. Four-engine widebody (B-747 and A-340) aircraft are expected to total 320 by the year 2000, up from 159 aircraft in 1988.

AIRBORNE HOURS

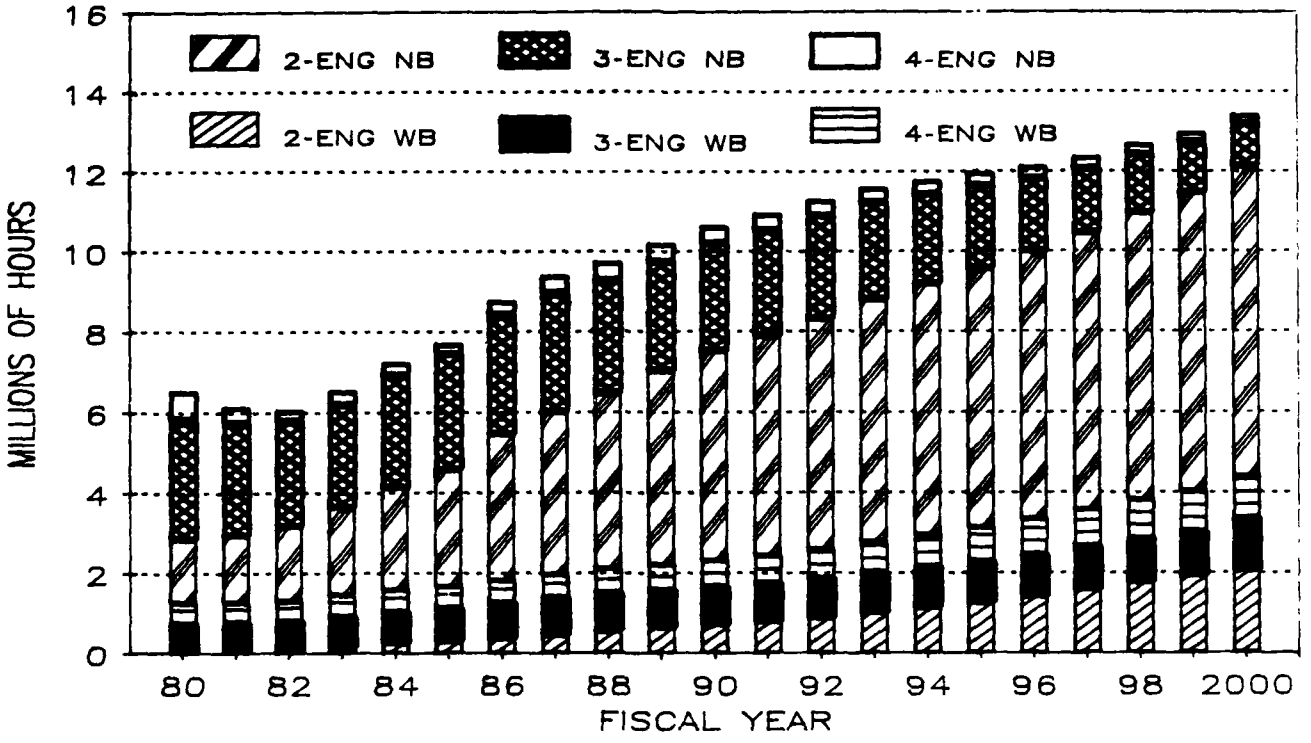
U.S. commercial air carriers flew 9.7 million hours in fiscal year 1988, an increase of 3.7 percent over 1987. Two aircraft categories accounted for the majority of these airborne hours; two-engine narrowbody aircraft (44.7 percent) and three-engine narrowbody aircraft (28.9 percent). By the year 2000, the number of airborne hours is forecast to increase to 13.4 million, an average annual increase of 2.7 percent.

A large part of the growth in airborne hours (32.9 percent) is expected to occur during the first 3 years of the forecast period, reflecting the the large numbers of aircraft scheduled to be delivered to U.S. airlines during this period. In addition, hubbing activity is expected to continue to increase at many large and medium hub airports. The number of air carrier airborne hours is forecast to increase by 4.7 percent in 1989, 4.3 percent in 1990, and 2.9 percent in 1991.

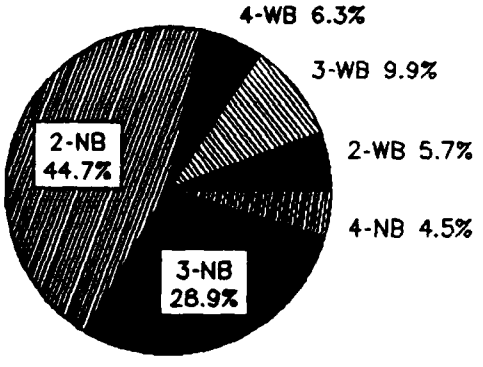
Two-engine narrowbody aircraft are expected to account for 57.6 percent of total airborne hours in the year 2000, increasing at an annual rate of 4.9 percent over the 12-year forecast period. Airborne hours by two-engine widebody aircraft are expected to grow at an annual rate of 11.5 percent over the same time period. The two-engine widebody aircraft are expected to account for 15.3 percent of total airborne hours in the year 2000, up from only 5.7 percent in 1988. The number of airborne hours flown by three-engine narrowbody aircraft is expected to decline by 61.9 percent between 1988 and the year 2000, reflecting not only the retirement of many of the older stage-2 aircraft but the declining utilization rates of those aircraft still in service.

U.S. COMMERCIAL AIR CARRIERS

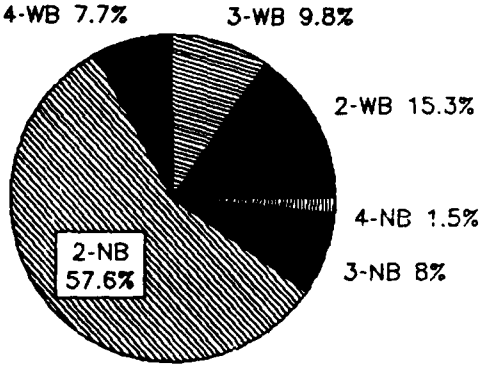
AIRBORNE HOURS



PERCENT BY AIRCRAFT TYPE



1988



2000

CHAPTER IV

REGIONALS/COMMUTERS

CHAPTER IV
REGIONALS/COMMUTERS

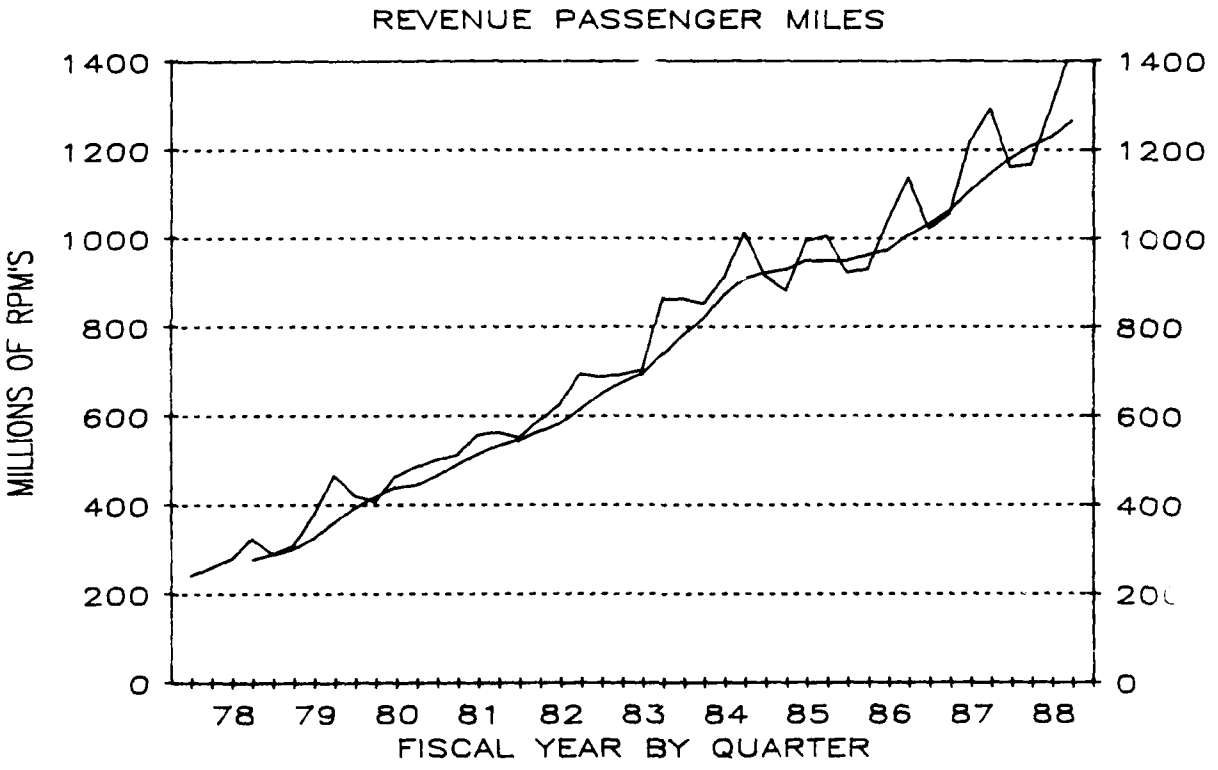
The regional/commuter airline industry, for the purpose of this forecast, is defined as those air carriers that provide regularly scheduled passenger service and whose fleets are composed predominantly of aircraft having 60 seats or less. During 1988, 176 regional/commuter airlines reported traffic data to RSPA on Form 298-C (a listing of these airlines is presented in Appendix F). The FAA historical data base includes activity for all regionals/commuters operating in the 48 contiguous states, Hawaii, Puerto Rico, and the U.S. Virgin Islands. Excluded from the data base is activity in Alaska, other U.S. territories, and foreign territories. Additionally, the regional/commuter traffic statistics include duplicated data for selected operators incl ded in the air carrier traffic statistics. The duplication is for those air carriers operating both large jets (over 60 seats) and commuter type aircraft (see technical notes at the beginning of Chapter X for Table 7 and Table 14).

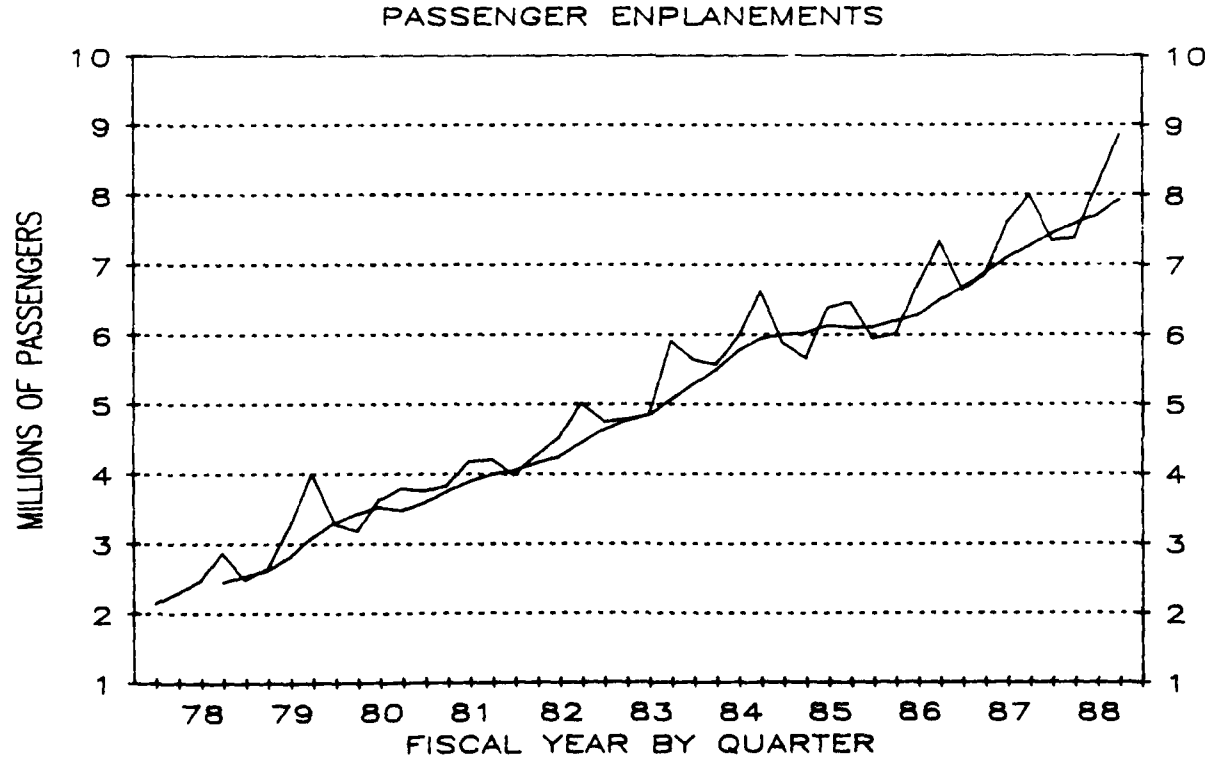
REVIEW OF 1988

Since 1984, the regional/commuter airline industry has been in a period of transition. In 1985, there was a dramatic growth in the number of code-sharing agreements with the major air carriers. This was followed in 1986 by a wave of large jet air carrier acquisitions of, or equity interest in, their regional/commuter code-sharing partners. In 1988, this consolidation process has continued.

In fiscal year 1988, the growth of the regional/commuter airline industry again has out-paced the growth of the larger commercial air carriers. Total revenue passenger enplanements increased by 8.9 percent to 30.5 million, while revenue passenger miles increased by 9.0 percent to just over 4.4 billion. For the 48 states, enplanements increased 12.5 percent, and passenger miles increased by 11.7 percent. Traffic in Hawaii, Puerto Rico, and the U.S. Virgin Islands, however, posted a significant decline due to the cessation of operations by Mid-Pacific Airlines. Passenger enplanements and revenue passenger miles dropped 29.2 percent and 38.4 percent respectively.

U.S. REGIONALS/COMMUTERS TRAFFIC TRENDS
ACTUAL AND MOVING AVERAGE





As noted earlier, the regional/commuter traffic data presented in this forecast document do not include traffic in Alaska, and foreign territories. During 1988, passenger enplanements for regional/commuter airlines operating in these areas totaled 1.3 million, up 11.0 percent from 1987. Traffic in Alaska was relatively unchanged--increasing only about 0.5 percent. Growth occurred primarily in the Caribbean and Pacific territories.

TEN YEARS AFTER DEREGULATION

From its formal recognition in 1969, the regional/commuter airline industry developed and grew in an unregulated environment. However, this is not to say that the industry has not been impacted by the Airline Deregulation Act of 1978. Dramatic changes have occurred within the industry in the 10 years following deregulation. To illustrate these changes one needs only to look back at a snapshot of 1978, trace the major developments over the last 10 years which have shaped today's industry, and compare it with the industry as it exists today.

In 1978, 210 regional/commuter operators enplaned just under 10.4 million passengers, an average of approximately 49,500 enplanements per carrier. Then, as today, the industry was dominated by a relatively small group of carriers, generally defined as the top 50 operators. In 1978, the top 50 carriers enplaned over 8.7 million passengers, an average of approximately 174,500 per carrier, and accounted for 84.0 percent of the total industry enplanements.

By 1988, 176 regional/commuter operators enplaned just over 31.7 million passengers, an average of approximately 180,200 enplanements per carrier. This represents an increase of over 205 percent in total passenger enplanements, or an average annual growth rate of 11.8 percent for the 10-year period. The top 50 operators enplaned just under 29.1 million passengers, an average of 581,000 enplanements per carrier, and accounted for 91.7 percent of the industry total.

Two major carriers - Air Wisconsin and Empire Airlines - were excluded from the regional/commuter data base in 1986 and 1984, respectively. The preceding comparisons, both at the industry level and for the top 50 carriers, include their traffic in 1978 and exclude it in 1988.

While dramatic, these impressive growth statistics belie the depth of the significance of the changes that have occurred within the industry. During the 10-year period since deregulation the fundamental character of the industry has changed: from the relative size and sophistication of airline operations; the players involved (especially in terms of the dominant industry operators); and aircraft fleets; to the industry relationship with the large commercial air carriers in the national air transportation system.

The primary role of the industry, in the past and today, is to provide feeder service to the large hubs served by the large commercial air carriers. Over the course of time the scope of this role has increased.

Industry growth prior to deregulation was spurred by the conversion to large turbojet aircraft by the large scheduled commercial air carriers. This led to the abandonment of low density short-haul markets in favor of concentration on the high density medium- and long-haul markets best suited for the large jet aircraft. The route rationalization programs of the large jet operators accelerated in the first few years following deregulation. The commuter operators moved into the abandoned markets in which they could provide greater schedule frequency more economically than could be done with large jet aircraft. Following deregulation the regional/commuter industry posted dramatic growth rates both in the level of traffic and the number of new operators.

While the growth in industry traffic has been sustained at relatively high levels throughout the 10-year period since deregulation, the same cannot be said for the number of operators. The number of operators peaked at about 250 in 1981 and has since declined. Within a 2-year period after 1981 the number of operators dropped significantly, primarily due to bankruptcies resulting from a severe economic recession and the dramatic increase in fuel costs during this time. While most failures were among the smaller operators, a number of the larger industry operators also failed. However, there have also been a number of new entrants since 1978 which are now among the industry leaders in passenger traffic.

The success of the large survivors and the large new entrants in the industry is attributable mainly to the evolution of their relationship with the Major/National air carriers. The development and growth of the hub-and-spoke route systems of the majors, with its emphasis on traffic feed and control of passenger traffic from origin to destination, has changed the significance of the role of the regional/commuter airline industry. The hubbing operations of the Majors and Nationals gave rise to the development of code-sharing agreements between the Major/National air carriers and regional/commuter airlines, becoming a widespread practice in 1985 and growing since then. The importance of the traffic feed to the major/national air carriers by the regional/commuter operators is further evidenced by the fact that selected regionals/commuters have been acquired totally or in part by their larger partners beginning in 1986 and continuing into 1988. This all constitutes a trend toward increasing integration of the regional/commuter airline industry into a total air transportation system with the Major/National air carriers.

INDUSTRY COMPOSITION

In 1988 the composition of the regional/commuter airline industry differs significantly from that of 1978. The factors contributing to this change include economic/competitive influences, and marketing strategies and alliances. The results are a dramatic change in the players and much higher stakes in the survival process. In some respects 1988 might be viewed as the end of one era and the beginning of another.

Prior to deregulation most of the new entrants into the regional/commuter industry came from the ranks of air taxi operators who saw a potential for scheduled service in markets that could not be served economically by large jet aircraft. Many regional/commuter airlines began as small operations; out of the dreams and hard work of individual entrepreneurs or aviation pioneers. These pioneers include Britt, Henson, Ransome and Van Arsdale. While the airlines they created still exist, they have been bought out by their Major code-sharing partners. The end of the era of these industry pioneers is symbolically represented by the merging of Provincetown-Boston's operations, the oldest of the regional/commuter airlines, into Bar Harbor and no longer exists as a seperate entity.

The change in industry composition is best illustrated by comparing the list of the industry's top 50 airlines in 1978 with that of 1988 - presented in the tables in the following pages. Of the top 50 airlines in 1978, 22 have gone out of business (44.0 percent) - including the top 3, and 5 of the top 10. Of the remaining 28 airlines, three merged with other regional operators and 25 are still operating. Thus only one half of the dominant carriers in 1978 are still in business, including Air Wisconsin which is now classified as a National air carrier. To carry this one step further, of the 25 airlines still operating, 12 are subsidiaries of a major or another regional/commuter airline and five are no longer in the top 50 in 1988.

As can be seen from the above, significant changes have occurred within the industry during the ten years since deregulation, especially in the composition of the dominant industry carriers; many of which began operating during this time. Of the current top 50 regional/commuter airlines, 28 were in operation prior to 1978, while 22 began operating after 1978.

Two distinct but interrelated trends have shaped today's industry. These are industry consolidation and growing integration of operations with the Major and National air carriers.

At the industry level, traffic has shown strong sustained growth. However, since 1981 the number of regional/commuter operators has declined from a high of approximately 250 to 176 in 1988; although the number of carriers increased slightly in 1988. Also, during this time the size of the dominant industry carriers has increased dramatically. This has resulted in increased industry concentration with the top 50 carriers accounting for almost 92 percent of industry traffic in 1988 compared to 84.0 percent in 1978.

In addition to growth and increased concentration, the regional/commuter industry is becoming increasingly integrated with the larger air carriers. The first phase of the integration process began in 1985 with the widespread development of code-sharing agreements with the larger airlines. This was followed closely by the wave of acquisitions of regionals by the Majors and Nationals beginning in 1986 and continuing into 1988.

The significance of code-sharing agreements to the regional partners is evidenced by their growth and increasing dominance of the regional/commuter industry. Passenger traffic for the code-sharing regionals has increased from 18.4 million in 1985 to 28.1 million in 1988, a 52.7 percent increase.

TOP 50

REGIONAL/COMMUTER AIRLINES

FISCAL YEAR 1978

1. Golden West	26. AeroMech
2. Prinair	27. Air North (ANA Ltd)
3. Air New England	28. Command
4. Ransome	29. Bar Harbor
5. Air Wisconsin	30. Wright
6. Metroflight	31. Royale
7. Rio	32. Aero Virgin Islands
8. Henson	33. Commuter
9. Antilles Airboats	34. Southern Jersey
10. Provincetown-Boston	35. Florida & Air South
11. Britt	36. Air Midwest
12. Pennsylvania	37. Air Hawaii
13. Air Caribbean	38. Mid-State
14. Rocky Mountain	39. Mississippi Valley
15. SwiftAire	40. Scheduled Skyways
16. Cascade	41. Chautauqua
17. Royal Hawaiian	42. Columbia Pacific
18. Altair	43. Marco Island
19. Alaska Aeronautical	44. Crown Airways
20. Aspen	45. Viequies Air Link
21. Air Sunshine	46. Capitol
22. Suburban	47. Sierra Pacific
23. Air Illinois	48. Pocono
24. Pilgrim	49. Skystream
25. Scenic	50. Mackey

Source: RSPA Form 298-C

TOP 50

REGIONAL/COMMUTER AIRLINES

FISCAL YEAR 1988

1. Atlantic Southeast	26. Chautauqua
2. Henson	27. Sunaire
3. Simmons	28. Mesaba
4. Horizon	29. Nashville Eagle
5. Westair	30. Brockway
6. Comair	31. Crown
7. Bar Harbor	32. Pilgrim
8. Express Airlines I	33. Resort Air
9. Air Midwest	34. North Pacific/NPA
10. SkyWest	35. Mesa Air Shuttle
11. Wings West	36. Precision Valley
12. Pan Am Express	37. Mid Pacific
13. Aspen	38. Scenic
14. Britt	39. Provincetown-Boston
15. CCAir	40. ANA Ltd.
16. Jetstream International	41. Pocono
17. Rocky Mountain	42. Tropic Air
18. Pennsylvania	43. Aloha Island Air
19. Metro-flight	44. Virgin Isl. Seaplan
20. Eastern Metro Express	45. San Juan
21. Command	46. ERA
22. Suburban	47. Big Sky
23. Executive Air Charter	48. Air Kentucky
24. Business Express	49. Vieques Air Link
25. Chaparral	50. Aero Coach

Source: RSPA Form 298-C and Form 41

The importance of code-sharing agreements to the major/national air carriers, and the degree of integration of the regionals into their operations, is illustrated by the volume of traffic feed generated by the regionals and the number of regional airlines acquired totally, or in part by, their larger partners. Of the current top 50 regional/commuter airlines, 19 are owned totally or in part by a major/national air carrier and 7 are owned by another regional. When categorized by corporate ownership, the top 10 corporate structures accounted for just under 68 percent of the 1988 industry passenger enplanements - 51.0 percent by regionals owned, totally or in part, by a Major/National air carrier. Defined in this manner the top 30 corporate structures accounted for over 90 percent of the industry traffic.

Top 30 Corporate Structures

Carrier/ Carrier Group	Percent of Industry Enplanements	Carrier/ Carrier Group	Percent of Industry Enplanements
1. Delta	11.3	16. Chautauqua	1.3
2. USAir/Piedmont	11.0	17. Northwest/Mesaba	1.2
3. American	10.9	18. Resort Air	1.0
4. Texas Air	8.7	19. Mesa	0.9
5. Metro	7.2	20. Precision	0.9
6. WestAir	5.4	21. Mid Pacific	0.8
7. Alaska/Horizon	4.5	22. Scenic	0.7
8. Express Airlines I	3.0	23. Pocono	0.6
9. Air Midwest	2.9	24. Tropic Air	0.6
10. Brockway	2.8	25. Aloha/Aloha Island Air	0.6
11. Pan AM/Pan Am Express	2.8	26. Virgin Isls. Seaplane	0.5
12. Aspen	2.8	27. San Juan	0.5
13. Business Express	2.6	28. ERA	0.5
14. CCAir	2.4	29. Big Sky	0.4
15. Executive Air Charter	1.6	30. Air Kentucky	0.4

Categorizing carriers by corporate ownership, together with the large independent regionals, points out that the degree of industry concentration is much higher than is indicated by the top 50 reporting units. It also highlights the extent of integration of the regional/commuter industry with the large commercial air carriers.

AIR CARRIER/COMMUTER AIRLINES

CODE-SHARING AGREEMENTS

AIR CARRIER PROGRAM NAME	DESIGNATED COMMUTER CARRIER	HUBS SERVED
1. ALASKA Airlines	Horizon*	Portland/Seattle
2. ALOHA Airlines	Aloha Island Air	Honolulu
3. AMERICAN Eagle	Chaparral	Dallas/Ft. Worth
	Command	Boston
		New York
	Executiv Air Charter	San Juan
	Metro	Dallas/Ft. Worth
	Nashville Eagle	Nashville
		Raleigh/Durham
	Simmons	Chicago
	Wings West	Los Angeles
		San Francisco
4. BRANIFF Express	Air Midwest	Kansas City
	Capitol	Kansas City
	Midcontinent	Kansas City
5. CONTINENTAL Commuter	Britt	Cleveland
		Houston
	Bar Harbor	Boston
	PBA	Newark
	Rocky Mountain	Denver
	Southern Jersey	Philadelphia
6. DELTA Connection	Atlantic Southeast	Atlanta
		Dallas/Ft. Worth
	Business Express	Boston
		New York
	Comair	Cincinnati
		Dayton
		Los Angeles
	SkyWest	Salt Lake City

AIR CARRIER/COMMUTER AIRLINES

CODE-SHARING AGREEMENTS (CONTINUED)

AIR CARRIER PROGRAM NAME	DESIGNATED COMMUTER CARRIER	HUBS SERVED
7. EASTERN Express	Atlantis	Atlanta
	Bar Harbor	Boston
		New York
		Philadelphia
	Eastern Metro Express	Atlanta
		San Juan
	Pocono	Philadelphia
	Precision	Boston
		New York
8. MIDWAY Connection	Midway Commuter	Chicago
	Iowa Airways	Chicago
9. NORTHWEST Airlink	Big Sky	Billings
		Helena
	Express Airlines I	Memphis
		Minneapolis/St. Paul
	Mesaba	Minneapolis/St. Paul
	Simmons	Detroit
10. PAN AM Express	Pan Am Express	New York
		Philadelphia
	Resort Commuter	Los Angeles
11. PIEDMONT Commuter	Brockway	Boston
		New York
		Syracuse
	CCAIR	Charlotte
	Henson	Baltimore
		Charlotte
		Florida
	Jetstream	Baltimore
		Dayton
12. TRANS WORLD Express	Air Midwest	St. Louis
	Resort Air	St. Louis
	Virgin Island Seaplane	San Juan

AIR CARRIER/COMMUTER AIRLINES

CODE-SHARING AGREEMENTS (CONTINUED)

AIR CARRIER PROGRAM NAME	DESIGNATED COMMUTER CARRIER	HUBS SERVED
13. UNITED	Aspen*	Denver
	NPA	Portland
		Seattle
	San Juan	Portland
		Seattle
	Westair*	Los Angeles
		San Francisco
14. ALLEGHENY Commuter (U.S.AIR)	Air Kentucky	Louisville
		Indianapolis
	Chautauqua	Orlando
		Pittsburgh
	Crown	Pittsburgh
	Pennsylvania	Pittsburgh
		Philadelphia
	Southern Jersey	Philadelphia
	Suburban	Pittsburgh
		Philadelphia

* Carrier operates both large jet and small commuter aircraft.

FORECAST ASSUMPTIONS

Industry growth will continue to outpace that of the larger commercial air carriers, and be driven by increased demand placed on a stable, mature regional/commuter industry. The introduction of new state-of-the-art aircraft offering amenities similar to those found on large jet aircraft will contribute to greater public acceptence and stimulate higher growth. Increasing integration of service with the Majors, together with the introduction of new aircraft, will lead to further route rationalization programs by the Majors opening additional opportunities for growth for the regional/commuter industry. The average passenger trip length is expected to increase over the forecast period, but the industry will continue to serve primarily short-haul markets; with emphasis on improved quality and schedule frequency in the markets best suited to their operations.

It is expected that the aircraft fleet will continue to grow over the forecast period and the average seats per aircraft is expected to increase from 19.2 in 1988 to 30.9 in 2000, an average annual growth of 4.0 percent. The average passenger trip length in the 48 States is projected to increase from 160.0 miles in 1988 to 195 miles in 2000, an average growth rare of 1.7 percent; while the average trip length for Hawaii/Puerto Rico/Virgin Islands is expected to increase from 84.9 miles in 1988 to 91.0 miles in 1995 and remain constant through the balance of the forecast period. The average industry load factor is expected to increase slightly from 46.4 percent in 1988 to 47.3 percent in 2000 reflecting continued emphasis on frequency of service. A year-by-year detail of the above assumptions is presented in Table 13.

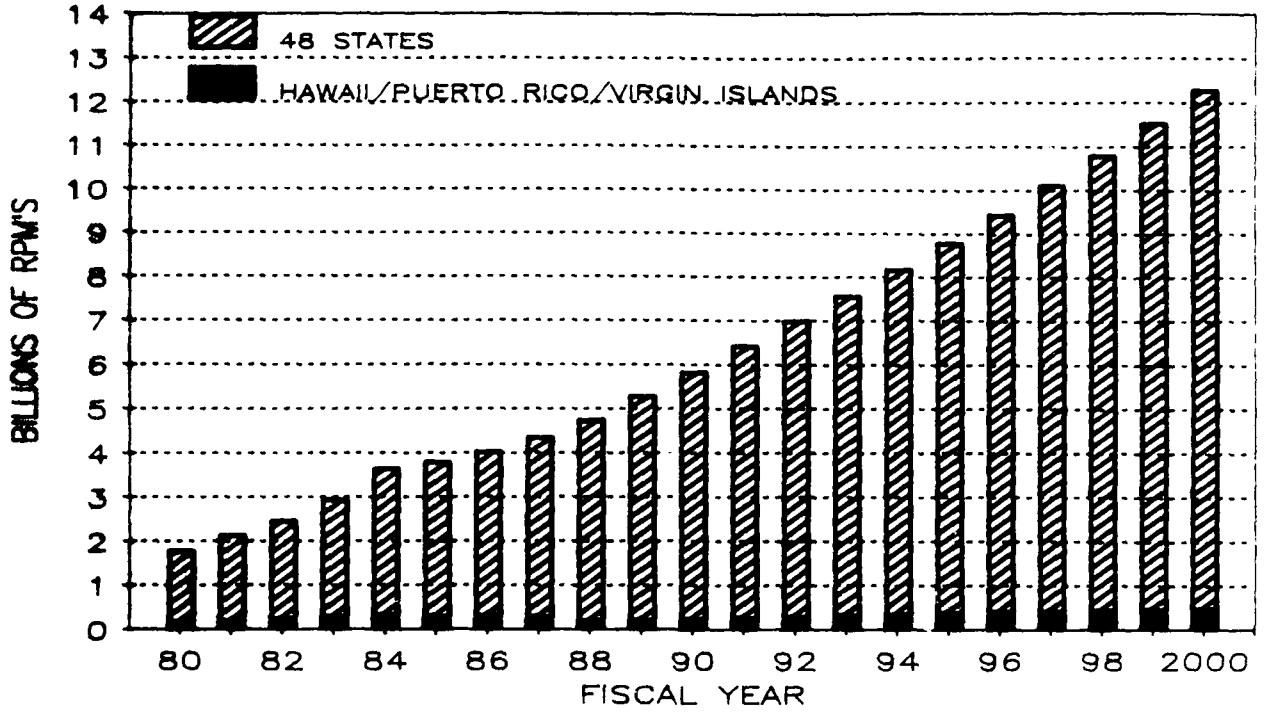
REGIONALS/COMMUTERS FORECASTS

REVENUE PASSENGER MILES

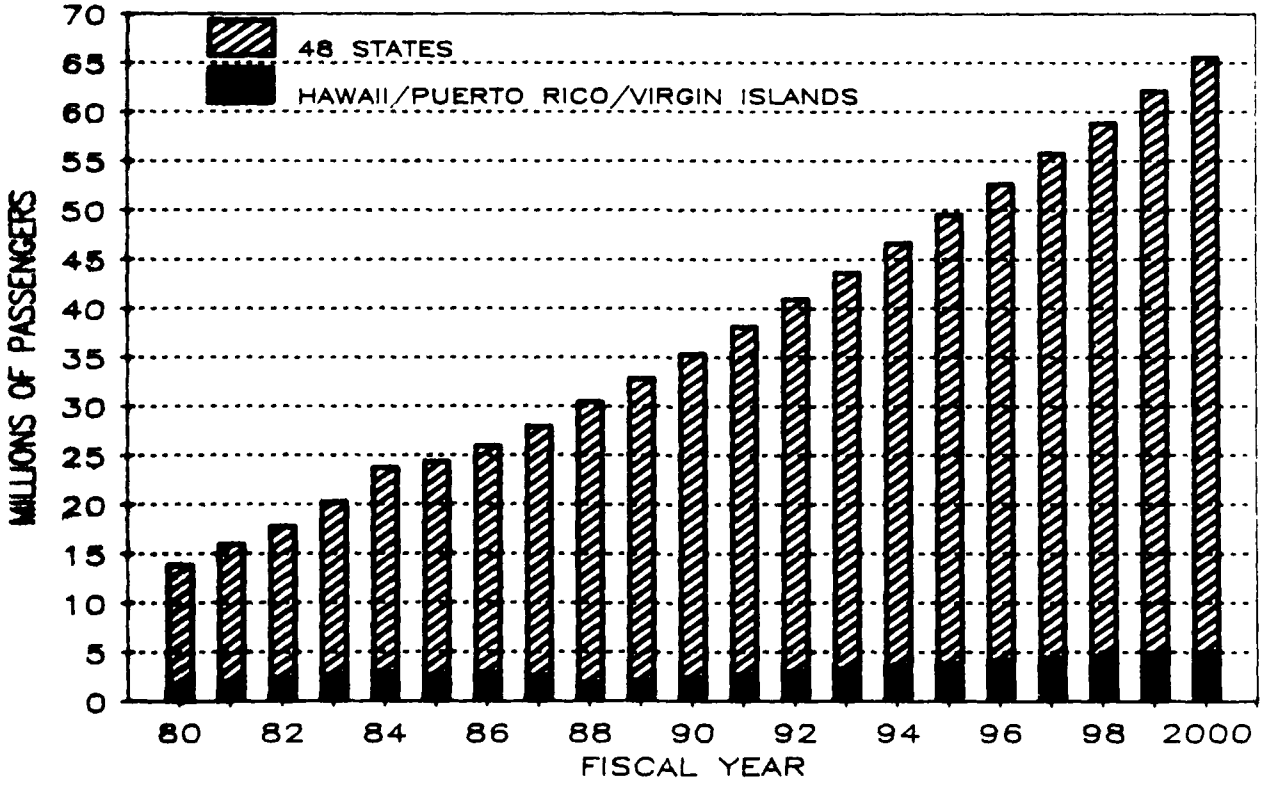
Revenue passenger miles are expected to total 12.3 billion in 2000. Passenger miles are projected to increase 11.5 percent in 1989 and 10.2 percent in 1990, and to average 8.2 percent over the 12-year forecast period. In the 48 contiguous states, revenue passenger miles are forecast to total 11.9 billion in 2000, increasing by 11.1 percent in 1989 and 10.0 percent in 1990, and averaging 8.2 percent between 1988 and 2000. Traffic in Hawaii, Puerto Rico, and the U.S. Virgin Islands is forecast to increase by 13.2 percent in 1989, and 17.1 percent in 1990, and to average 9.7 percent over the entire forecast period, totaling 436.8 million passenger miles in 2000.

U.S. REGIONALS/COMMUTERS

SCHEDULED REVENUE PASSENGER MILES



SCHEDULED PASSENGER ENPLANEMENTS



PASSENGER ENPLANEMENTS

Passenger enplanements are forecast to reach 65.6 million in 2000, more than double the 1988 enplanements. Overall, passenger enplanements are expected to increase by 7.9 percent in 1989 and 7.6 percent in 1990, and to average 6.6 percent over the forecast period. In the 48 states, passenger enplanements are projected to increase 7.6 percent in 1989 and 7.1 percent in 1990, and to average 7.1 percent between 1988 and 2000, totaling 60.8 million in 2000. Passenger enplanements in Hawaii, Puerto Rico, and the U.S. Virgin Islands are expected to total 5.8 million in 2000, growing by 11.8 percent in 1989 and 15.8 percent in 1990, and averaging 9.0 percent over the 12-year forecast period.

REGIONAL/COMMUTER FLEET

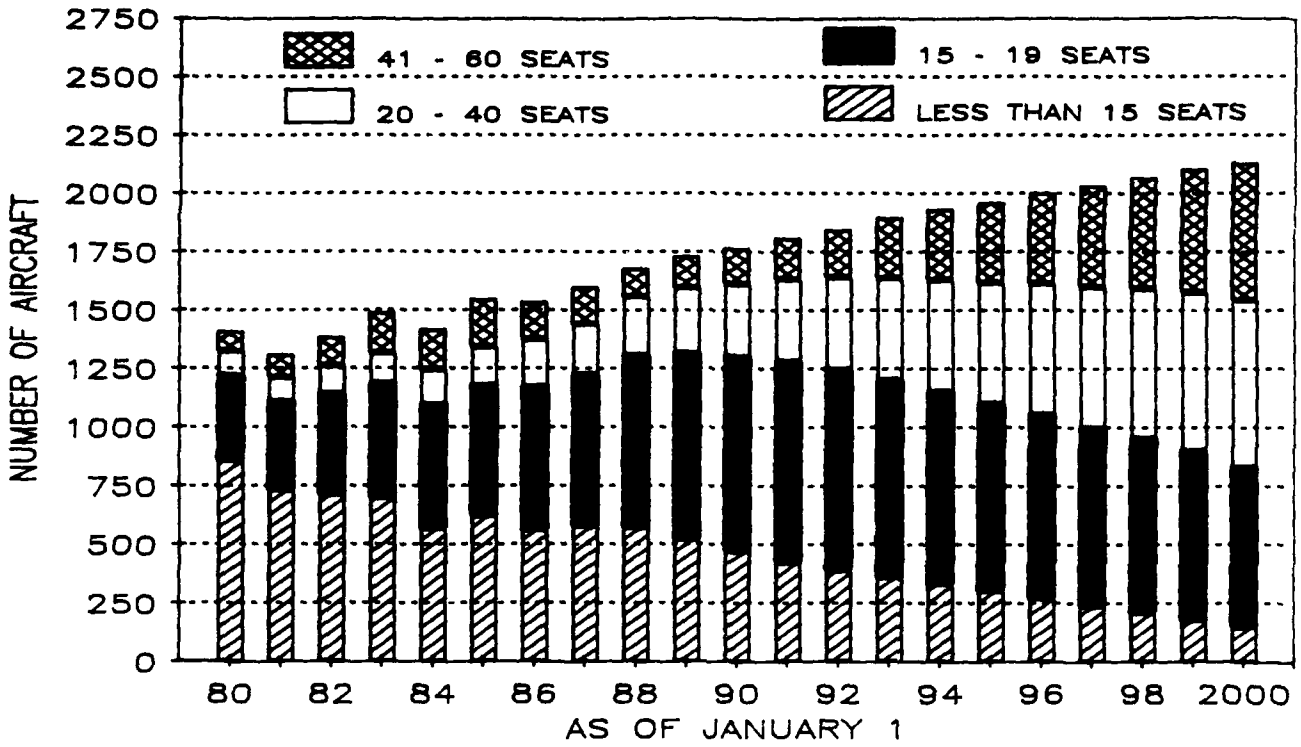
Prior to deregulation, the regional/commuter fleet was composed primarily of small general aviation aircraft, generally seating less than 12 passengers. This was thought to have undermined the image of the industry and inhibited public acceptance. With deregulation and the relaxation of the aircraft size restriction, the door was opened for the development and introduction of a new generation of aircraft designed specifically for use in regional markets. With the introduction of these new aircraft beginning in the early 1980's and with additional new models coming on-line over the next several years, today's fleet is increasingly composed of new state-of-the-art aircraft offering amenities similar to those found on large jet aircraft. This, together with increasing integration of services with the Majors, has dramatically changed the character and public acceptance of the industry. The impact of the introduction of larger new aircraft is reflected in the growth of the average seats per aircraft from 11.9 in 1978 to 19.2 in 1988, an increase of 61.3 percent while the fleet grew by 19.2 percent during the same period.

Over the forecast period it is projected that the average seats per aircraft will continue to grow at a slightly faster rate than the growth of the fleet reflecting the continued introduction of larger aircraft. The fleet is projected to grow at an annual rate of 2.0 percent, increasing from 1,684 in 1988 to 2,136 in 2000. During this time the average seats per aircraft is projected to grow at an annual rate of 4.0 percent, increasing from 19.2 in 1988 to 30.9 in the year 2000.

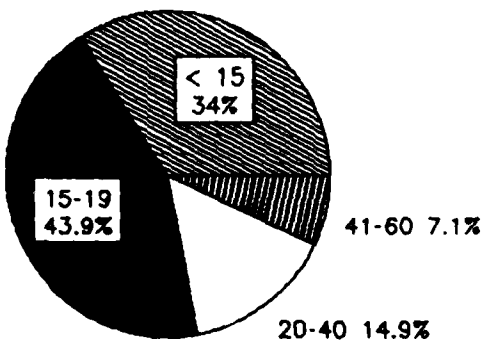
In 1980, aircraft with less than 15 seats accounted for 60.9 percent of the total commuter fleet. By 1988, this category's share of the total fleet had declined to just under 34.0 percent. This downward trend is expected to continue throughout the forecast period. The number of aircraft in the "less than 15 seats" category is expected to decline by 73.8 percent between 1988 and the year 2000, and to account for 7.0 percent of the total fleet in the year 2000.

U.S. REGIONALS/COMMUTERS

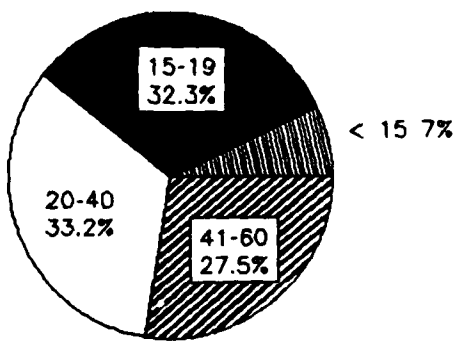
PASSENGER AIRCRAFT



PERCENT BY AIRCRAFT SEAT SIZE



1988



2000

The "15-19 seats" category represents the largest portion of the fleet, increasing from 25.8 percent in 1980 to 43.9 percent in 1988. While this category will continue to account for a large portion of the fleet throughout the forecast period, its relative share of the total fleet will decline to just under 32.3 percent in 2000.

The largest growth in the regional/commuter fleet will be in the "20-40 seats" and the "greater than 40 seats" categories. In 1980, these categories accounted for only 7.1 and 6.1 percent of the total fleet, respectively. By 1988, the "20-40 seats" category had increased to 14.9 percent and the "greater than 40 seats" category to 7.1 percent. By the year 2000, these two categories are expected to account for 60.7 percent of the total fleet, 33.2 percent in the "20-40 seats" category and 27.5 percent in the "greater than 40 seats" category. During the forecast period, aircraft in the "20-40 seats" category are expected to increase from 251 aircraft in 1988 to 710 in the year 2000, an average annual increase of 9.1 percent. Aircraft in the "greater than 40 seats" category are expected to increase from 120 aircraft in 1988 to 587 in the year 2000, an average annual growth of 14.1 percent. This trend toward larger aircraft will increase the average seating capacity per aircraft from 19.2 seats in 1988 to 30.9 seats in the year 2000.

CHAPTER V

GENERAL AVIATION

CHAPTER V
GENERAL AVIATION

The general aviation industry is undergoing structural changes. For the past 10 years, general aviation shipments have continuously declined from a peak of 17,811 units in 1978 to 1,085 in 1987. The decline in aircraft sales is complemented by decreasing numbers of private pilots. Between 1980 and 1988, the number of private pilots declined from 343,276 to 300,949. Between 1980 and 1988, the number of student pilots declined from 210,180 to 146,016.

Foreign competition, here and abroad, has challenged U. S. manufacturers. Foreign producers are making inroads into domestic markets, while exports are experiencing a protracted period of decline, falling from 3,995 units in 1979 to 429 units in fiscal year 1988.

General aviation has not responded to the current economic recovery, one of the most robust of the postwar period. Historically, the economic cycle of the general aviation industry has closely paralleled that of the national economy. The theories about the reasons for the decline in sales and pilots are diverse. Some cite high aircraft prices and the availability of low cost alternatives such as ultralights. Others hypothesize that high operating costs and interest rates have been responsible for depressing the industry. Still others allege that the changes in the tax laws and high product liability costs are responsible. To be sure, each one of these factors has had some effect. Numerous studies that have been conducted by the Office of Aviation Policy and Plans, by universities, and by the industry have shown that many of the factors cited above have outweighed the positive effects of a growing economy. This shrinking stock of pilots and the slowing in the expansion of the general aviation fleet has reduced the rate of growth of general aviation activity at FAA facilities.

Although the economics of the industry are important in affecting people's choices, we cannot overlook the fact that we may also be experiencing a fundamental change in the tastes and preferences of the population. In the long run, this could be as destabilizing to general aviation as the negative economic factors that have plagued the industry over the past 10 years. Changing tastes could upset the fundamental economic equations that have held

for many years for the industry. If this phenomenon is occurring, then falling prices, operating costs, and real interest rates, accompanied by economic growth, may not be sufficient to revive the market.

REVIEW OF 1988

FLEET COMPOSITION AND AIRCRAFT SHIPMENTS

As of January 1, 1988, the general aviation active fleet consisted of 217,183 aircraft, 1.3 percent less than in 1987. In 1988, the single engine and multi-engine piston fleets were down 0.5 percent and 2.1 percent, respectively. For the period 1980 through 1988, the active fleet grew at an annual growth rate of only 0.4 percent. Active fleet consists of any aircraft flown at least 1 hour during the previous year. Therefore, an aircraft is placed in the active fleet or the inactive fleet when the yearly status is reported by the registered owner in the sample survey of general aviation activity. It should also be noted that historical data are developed by a sample survey and subject to statistical variations.

From 1980 through 1988, the single engine piston fleet increased from 168,400 to 171,035, and multi-engine piston aircraft dropped from 25,100 to 23,419. For the 1980 through 1988 period, the turbine-powered fleet increased from 6,200 to 9,612, a yearly rate of growth close to 5.8 percent. Also, during this period, the rotorcraft fleet grew at an annual rate of 1.0 percent, an increase from 5,800 to 6,333.

Shipments of general aviation aircraft (excluding helicopters, balloons, dirigibles, and gliders) declined approximately 12.6 percent in fiscal year 1988. Single engine piston aircraft deliveries fell 11.7 percent. Shipments of multi-engine piston aircraft declined 43.3 percent, turboprop aircraft declined 4.4 percent, and turbojet aircraft declined 6.3 percent.

HOURS FLOWN

Total general aviation hours flown in fiscal year 1988 were 33.6 million, down 0.3 percent and 2.3 percent from fiscal years 1987 and 1986, respectively . In fiscal year 1988 single engine piston aircraft accounted for 65.8 percent of all hours flown, multi-engine piston aircraft for 14.6 percent, turbine-powered aircraft for 11.6 percent, and rotorcraft for 6.9 percent. Single engine piston aircraft hours flown were unchanged in fiscal year 1988, while turbine-powered aircraft hours declined 2.5 percent, and rotorcraft hours were unchanged.

During the period 1980 through 1988, total hours flown declined at an annual rate of 2.7 percent, single engine piston aircraft hours flown declined at a rate of 3.3 percent, turbine-powered aircraft hours grew at a 1.8 percent rate, and rotorcraft hours flown declined at a rate of 2.0 percent. In calendar year 1987, personal and instructional use accounted for 46.9 percent of all hours flown down from 50 percent in 1970. Between 1970 and 1987, the use of general aviation for business grew at a 1.3 percent annual rate, and personal and instructional use increased at a rate of approximately 0.8 percent a year.

PILOT POPULATION

Declining numbers of private pilots also evidence general aviation's changing characteristics. As of January 1, 1988, the total pilot population was 699,653--9,465 pilots less than in 1987. The current level is 15.4 percent below the maximum pilot population of 827,071 reached in 1981. In 1988, the number of private pilots was down 1.6 percent from 1987. The student pilot population declined 2.8 percent in 1988 to 146,016.

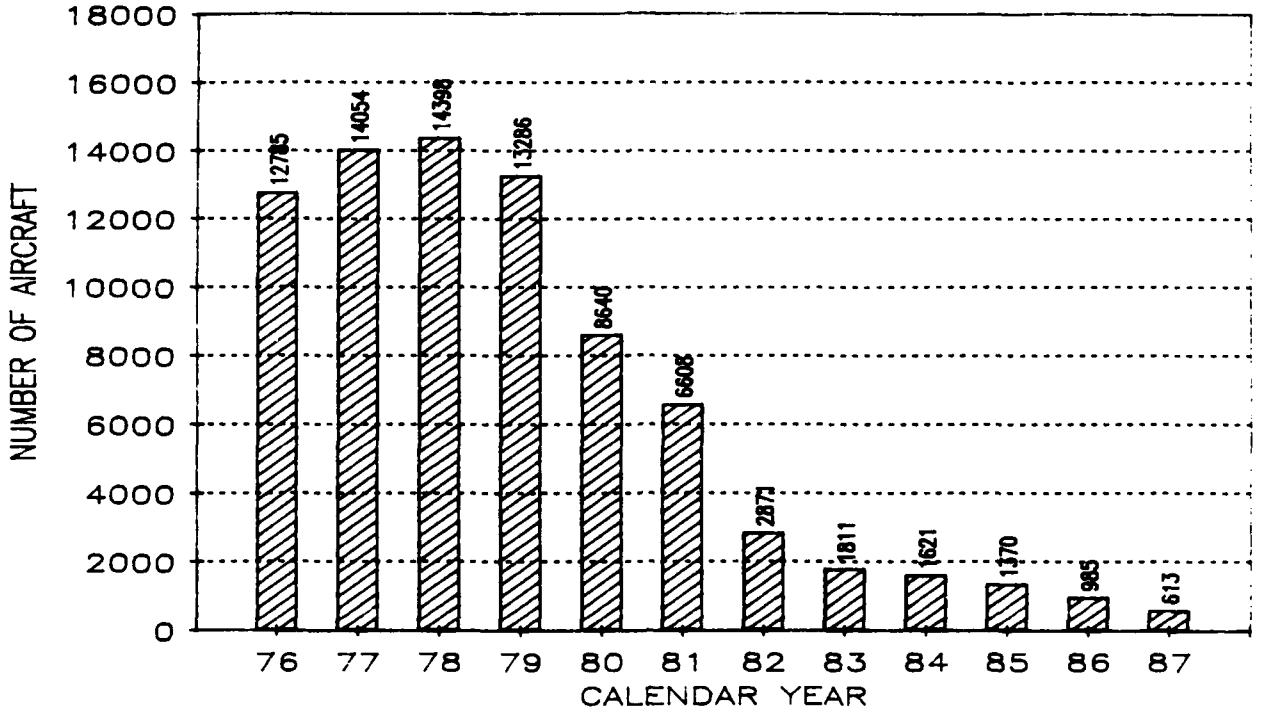
For the period 1980 through 1988, the total active pilot population declined at a yearly rate of 1.9 percent. From 1980 through 1987, the student pilot population dropped from 210,180 to 150,273, a yearly rate of decline of 4.7 percent, and declined 2.7 percent in 1988. The private pilot population fell from 343,276 in 1980 to 300,949 in 1988, a yearly rate of decline of 1.6 percent.

DISCUSSION OF STRUCTURAL CHANGES

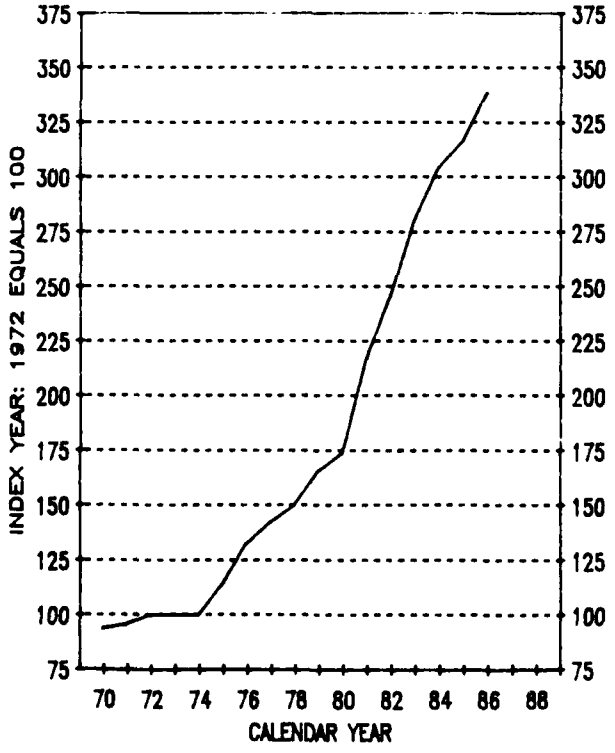
An indication that fundamental changes may have taken place in the industry is the failure of aircraft shipments to respond to an expanding economy. During previous economic cycles, changes in the general aviation industry have generally paralleled changes in business activity. Empirical results have shown that on the average a 1.0 percent increase in GNP, adjusted for price changes, will increase general aviation unit shipments by about 4.2 percent. However, since the long, precipitous decline of aircraft shipments began in 1979, this expected result has not occurred. For example, in 1979 real GNP increased 2.8 percent, and shipments declined 4.3 percent. Again in 1981, real GNP increased 2.6 percent, while shipments declined 21.0 percent. In 1983, an especially good year for the economy, GNP increased 3.4 percent and unit shipments fell 37.0 percent. In 1984, deliveries dropped 10.0 percent, while aggregate output of the economy increased an impressive 6.8 percent; and, in 1985 sales fell 17.0 percent, while GNP rose 2.7 percent. Although 1986 and 1987 have shown strong growth, shipments continue to fall below 1985 and 1986 levels. This relatively long run of declining production and increasing real GNP implies that other variables are outweighing the positive effects of income

SINGLE ENGINE PISTON AIRCRAFT TRENDS

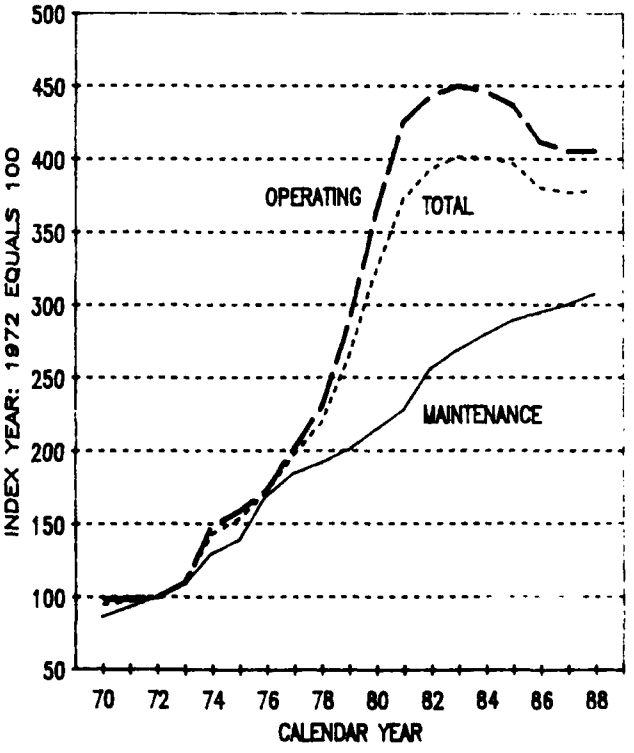
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES



OPERATING AND MAINTENANCE COSTS/HOUR



growth. It would not be expected that this persistent pattern would be due to chance alone. Air carrier deregulation has improved commercial service at many airports and further limited the circumstances in which it is beneficial for business and individuals to own and use general aviation aircraft. Factors such as the availability of low cost alternatives for recreational flying, changes in tastes and preferences, declining student and private pilot populations, rapidly rising prices and operating costs of conventional aircraft, and continued high real interest rates may all be contributing to the downturn. In the following sections, trends in the major economic forces affecting aircraft sales, exports, and pilots, are presented along with an analysis of aircraft prices.

SINGLE ENGINE PISTON AIRCRAFT

During the 1970's, single engine piston aircraft shipments increased at a steady rate, peaking in 1978 at 14,398 units. From 1978 through 1987, shipments continuously fell to 613 units, a yearly rate of decline of 29.6 percent. From 1978 to 1985, during this period of declining shipments, single engine piston aircraft prices increased at a yearly rate close to 11.0 percent. Real prices grew by a substantial 5.0 percent a year. The largest price increases occurred from 1980 through 1984, averaging about 14.0 percent a year. Aircraft prices increased 4.0 percent in 1985, and 7.0 percent in 1986. (The single piston price index has not been updated for 1987 and 1988 because none of the plane models used in computing the index is being produced currently.)

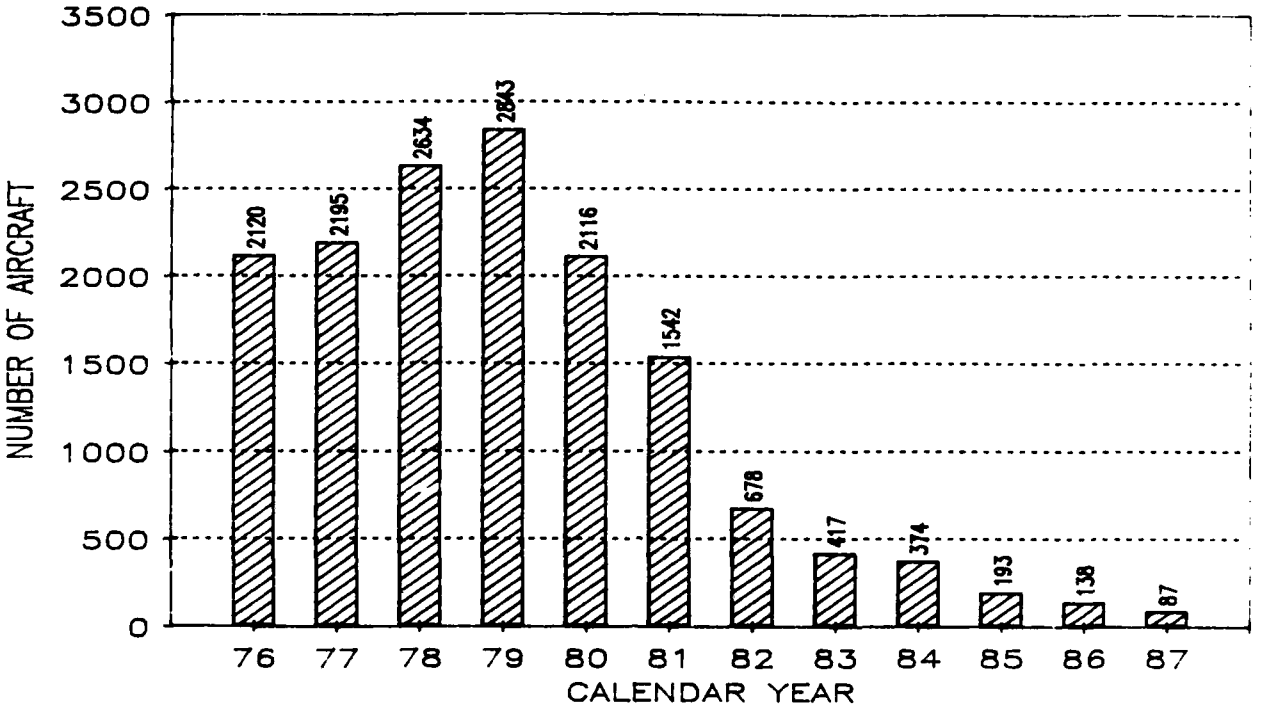
Operating and maintenance costs, particularly operating costs, have also been rising faster than the rate of inflation. From 1979 through 1983, fuel prices increased significantly due to the run-up in OPEC oil prices in 1979. However, since 1984 fuel prices have begun to decline, but at a relatively slow rate. The failure of general aviation gasoline and jet fuel prices to decline as rapidly as oil prices and the prices paid by commercial air carriers for jet fuel could be due to the desire of fixed base operators to maintain income levels in a shrinking market. Revenue from gasoline markups is generally used to pay for other services provided by the fixed base operator. When the amount of fuel sold decreases, the markup per gallon has to increase to pay these other costs. (See Appendix G for price and cost indices.)

MULTI-ENGINE PISTON AIRCRAFT

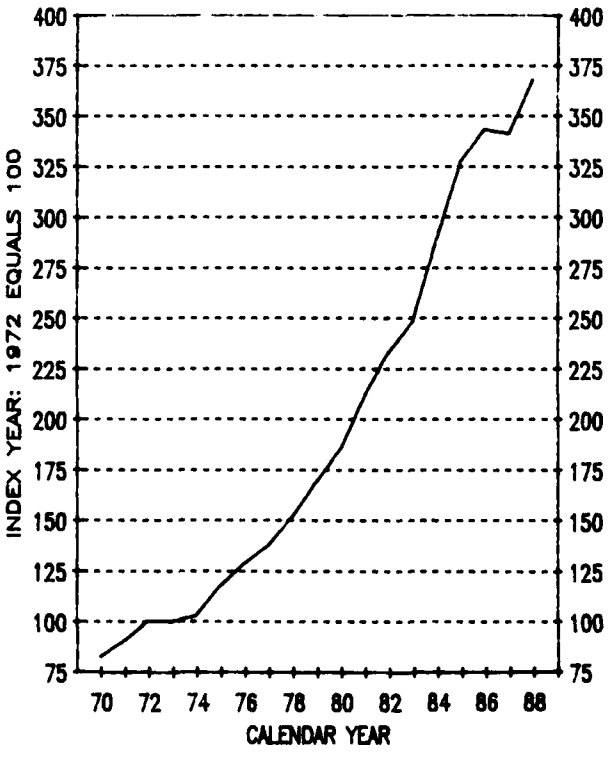
Shipments of multi-engine piston aircraft have followed a pattern similar to that of single engine piston aircraft. Shipments were strong throughout the 1970's, peaking in 1979 at 2,843 units. The average number of units shipped between 1970 and 1979 was 2,020. In 1987, only 87 aircraft were shipped, an average yearly decline of 35.3 percent from the peak in 1979. During the period of declining shipments, aircraft prices increased by over 9.0 percent annually. Aircraft prices adjusted for inflation increased at a rate close to

MULTI-ENGINE PISTON AIRCRAFT TRENDS

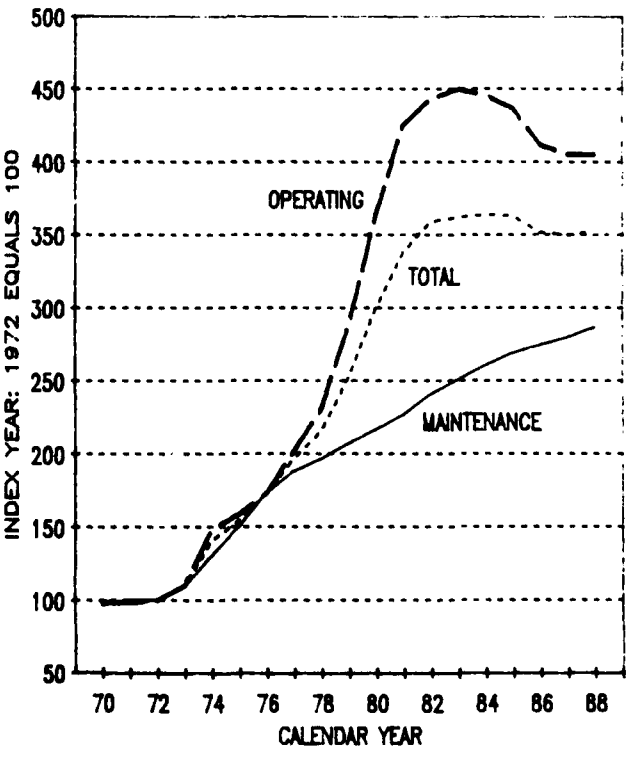
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES



OPERATING AND MAINTENANCE COSTS/HOUR



5.0 percent. The growth of operating and maintenance costs during the 1970's and 1980's was also significant. For the period 1970 through 1988, operating and maintenance costs increased at a yearly rate of 7.4 percent; real costs increased at an annual rate of about 1.3 percent. The relative importance of operating costs and maintenance costs can be discerned by calculating independent growth rates for these two series. For the period 1970 through 1988, maintenance costs increased at a yearly rate of 6.2 percent, while operating costs, predominantly fuel, increased at a yearly rate of 8.2 percent. Clearly, the large increases in operating and maintenance costs are largely attributable to fuel price changes. (See Appendix G for price and cost indices.)

TURBOPROP AIRCRAFT

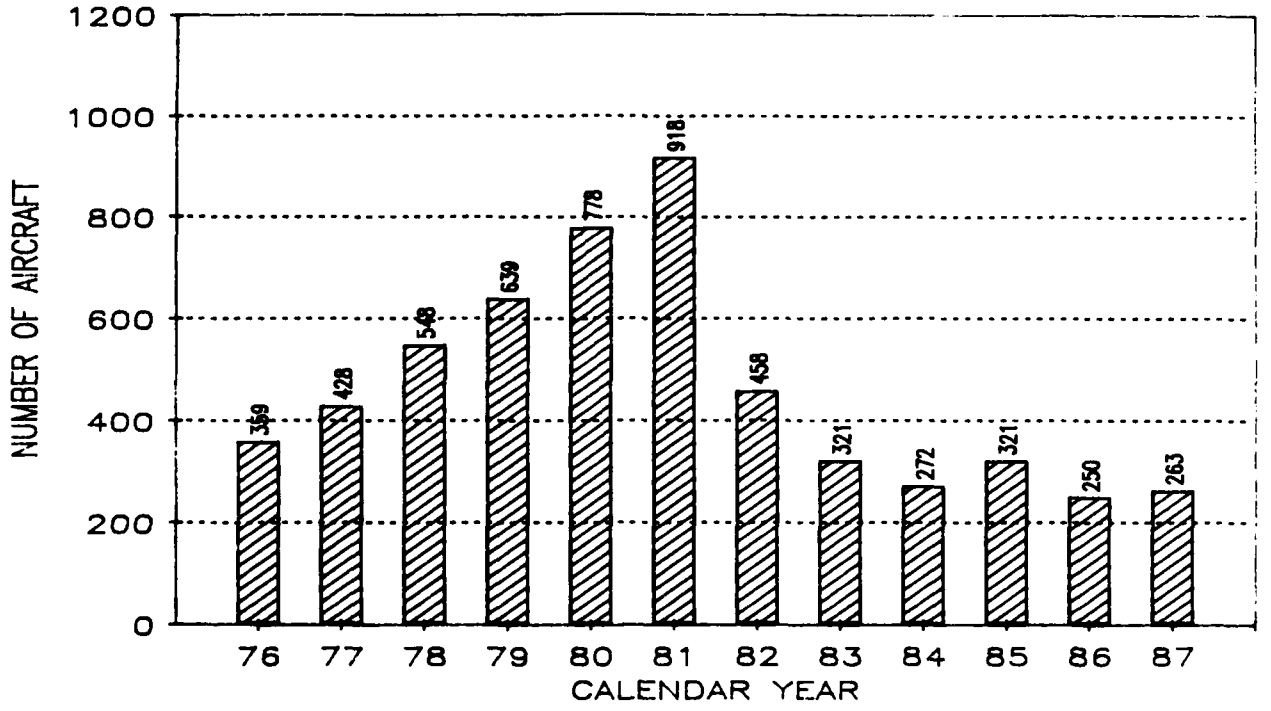
The piston aircraft market has not been the only segment of general aviation that has been experiencing a protracted recession. The demand for the larger, more sophisticated business aircraft, which was expected to be strong throughout the 1980's, has been relatively weak for the past 8 years. The expectations for sustained strong growth were formed during the 1970's when shipments of turboprop aircraft were expanding at an exceptional rate. In 1971, 89 turboprop units were shipped. Shipments continued increasing throughout the 1970's, reaching a maximum of 918 units in 1981. The average yearly growth rate of shipments during this period was 26.0 percent. The rapid decline of shipments began in 1982. Deliveries reached a level of only 250 units in 1986, down 22.0 percent from 1985. In 1987 shipments increased to 263, up 5.2 percent. Between 1979 and 1987, air craft prices accelerated, increasing at an annual rate of 7.1 percent. Real prices increased at a 1.5 percent yearly rate. Operating and maintenance costs also showed large increases during the latter part of the 1970's and early 1980's. (See Appendix G for price and cost indices.)

TURBOJET AIRCRAFT

Shipments of turbojet aircraft were 47 in 1971; shipments reached a maximum of 389 in 1981, declined to 122 in 1986, and remained at that level for 1987. This pattern is similar to that for the turboprop aircraft. During the growth period, shipments were increasing at an annual rate of over 24.0 percent. During the period of decline, shipments fell at an annual rate of approximately 17.6 percent. From 1979 through 1988, aircraft prices increased at a yearly rate of 7.8 percent, while real prices increased at a rate of 2.8 percent. Operating and maintenance cost movements paralleled those of the other aircraft previously discussed, increasing during the latter part of the 1970's and early 1980's, and then declining during the past 4 years, but not as fast as the decline in crude oil prices. (See Appendix G for price and cost indices.)

TURBOPROP AIRCRAFT TRENDS

AIRCRAFT SHIPMENTS



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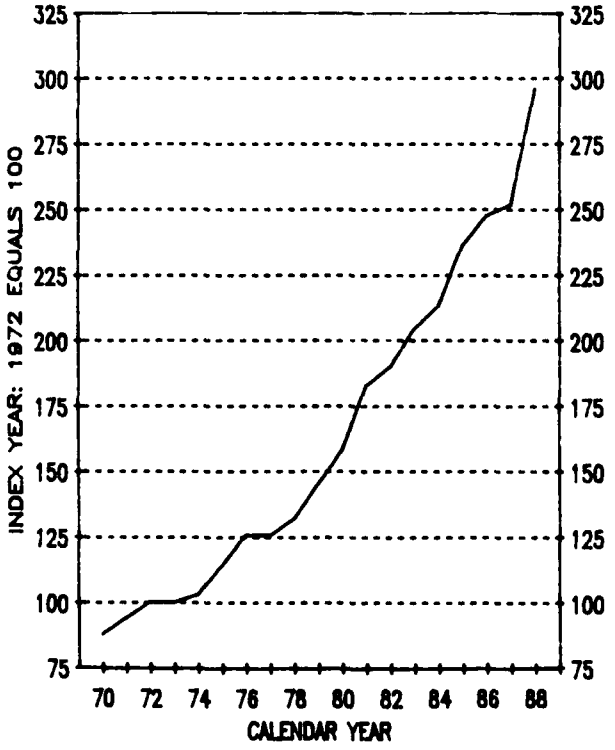
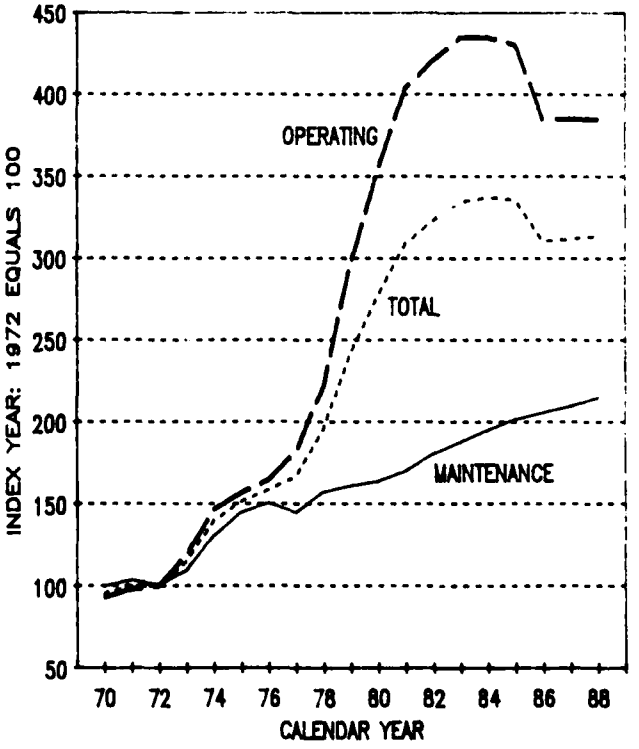
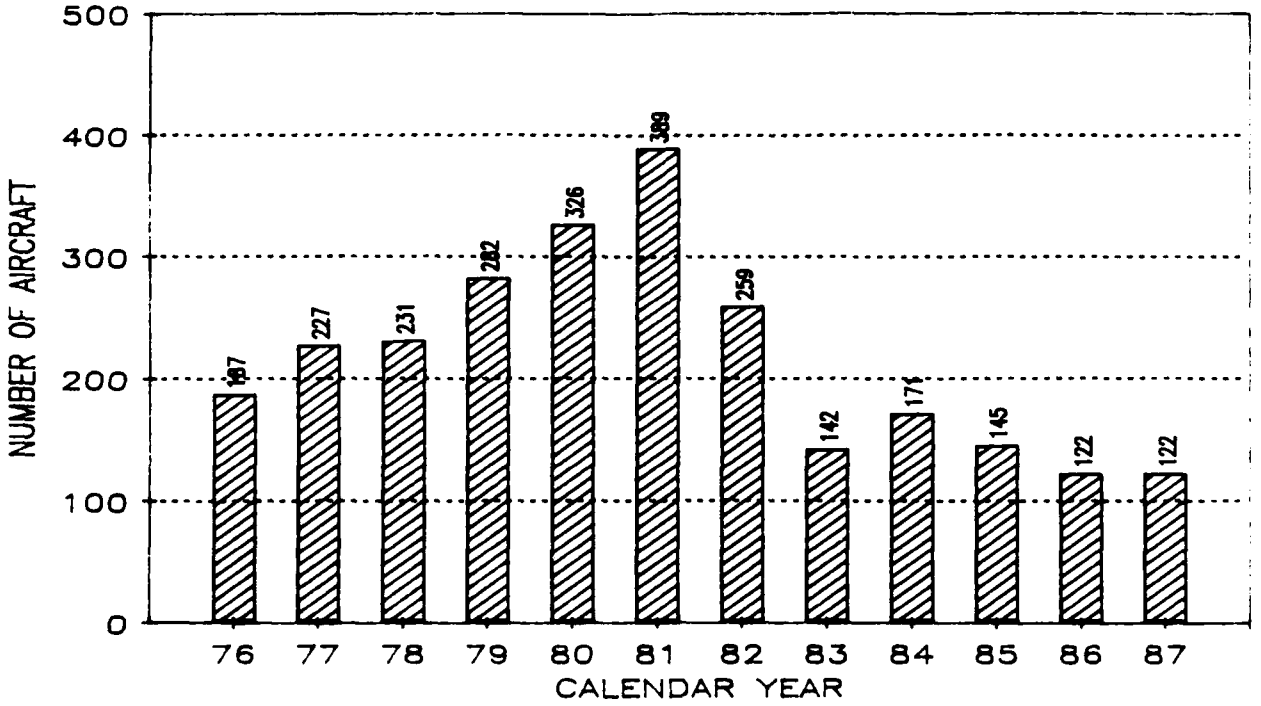


OPERATING AND MAINTENANCE COSTS/HOUR



TURBOJET AIRCRAFT TRENDS

AIRCRAFT SHIPMENTS



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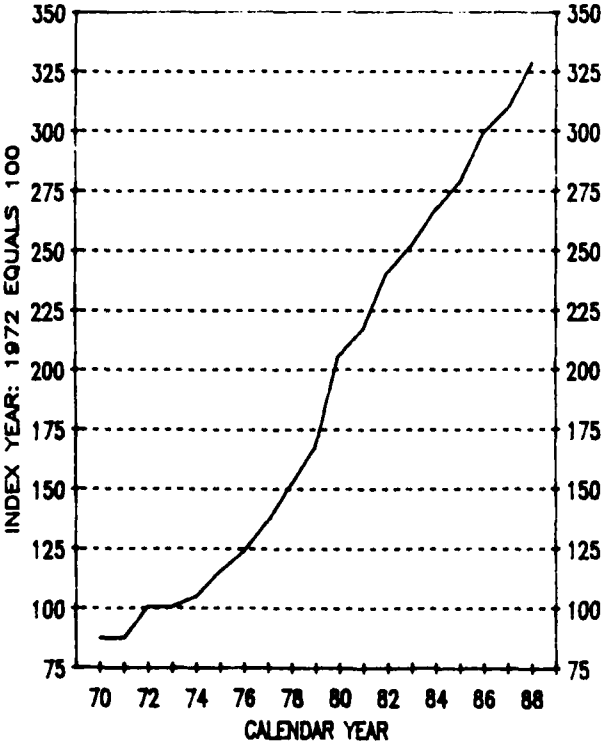
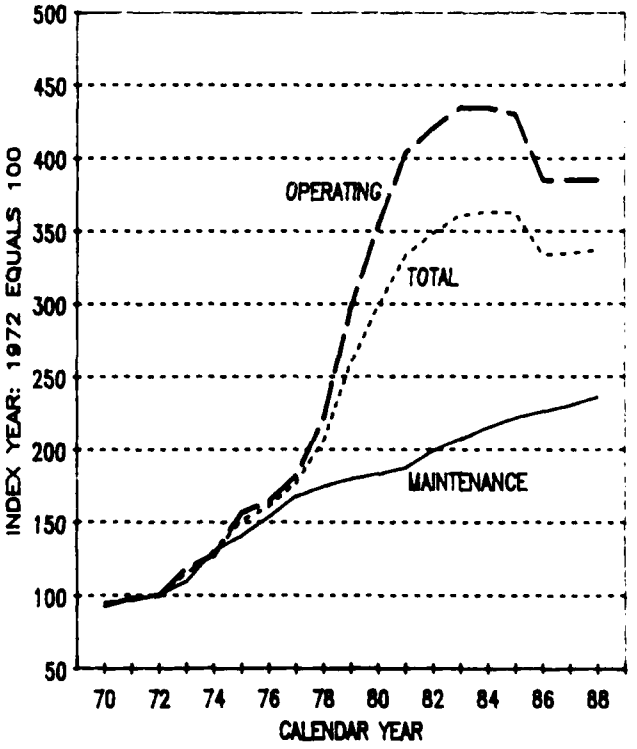


OPERATING AND MAINTENANCE COSTS/HOUR



EXPORTS

Exports dropped from 3,995 units in 1979 to 435 in 1986, a yearly rate of decline of approximately 24.2 percent. Further, net billings from exports declined from $756.4 million in 1980 to $230 million in 1985, but increased 49.4 percent ($343.6 million) in 1986 and 40.3 percent ($482 million) in 1987. Recent analyses have shown that prices of aircraft, the exchange rate, and world gross national product explain a large percentage of the variability in exports. In addition, the analyses indicated that relatively small increases in prices and the exchange rate will have a large negative impact on the foreign market. The turnaround in exports appears to be partly related to the continued improvement in exchange rates.

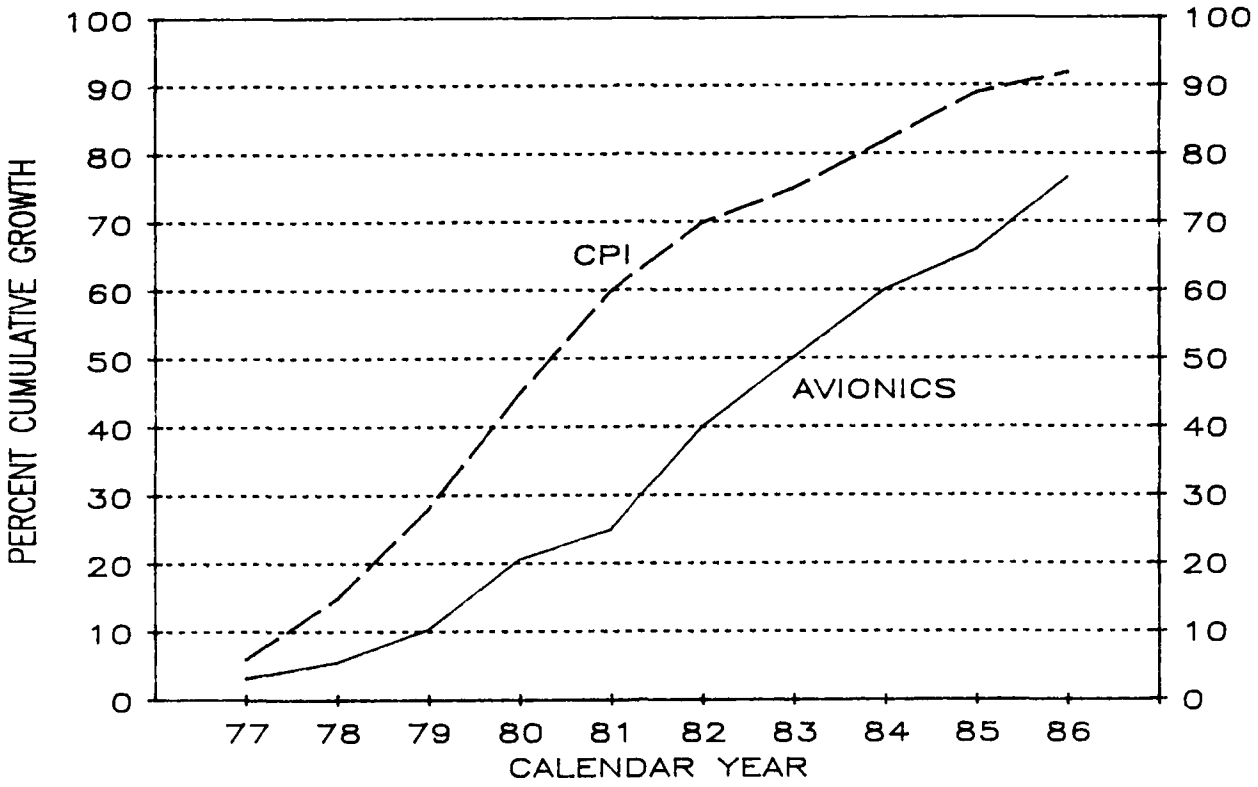
AIRCRAFT PRICE ANALYSES

Numerous studies during the past few years have shown that accelerating aircraft prices and operating and maintenance costs during the latter part of the 1970's and throughout the 1980's have had a dampening effect on domestic and international sales. Insights have been made into the reasons for the continued high operating costs. It was pointed out earlier that fuel prices have not declined as quickly as crude oil prices because of the desire of fixed base operators to maintain income levels in a shrinking market. In analyzing the underlying causes of price increases, however, inferences could only be made from a very limited data base. Data on the costs of aircraft production are unavailable. A breakdown of the costs of production over a relatively long time period is essential for isolating the factors that have been responsible for the recent escalation of prices.

PRICE OF AVIONICS

In order to look at price changes for avionics separately from aircraft prices, a 10-year time series of prices was constructed for six pieces of equipment suitable for installation on single engine piston aircraft. Prices for distance measuring equipment (DME), emergency location transmitters (ELT), transponders, VHF navigation receivers, VHF communication transceivers, and VHF navigation receiver/communications transceivers were collected for the years 1976 through 1986. It was not possible to obtain historical or current sales data for each of these items. Therefore, the average yearly prices for a number of models made by several different manufacturers were computed. In the process of computing the average prices, some of the most expensive items were eliminated, since it is unlikely they would be installed on a single engine piston aircraft. Tables in the study, The Demand for Single Engine Aircraft, August 1987, present item prices, average prices, annual growth rates, year-to-year price changes, and growth rates of the Consumer Price Index (CPI) for the same 10-year period. The graph of avionics and CPI cumulative price changes illustrates the overall results of the study.

COMPARISON OF AVIONICS AND CPI CUMULATIVE PRICE CHANGES FOR SINGLE ENGINE PISTON AIRCRAFT - 1976 TO 1986



Although there is considerable variation in year-to-year prices, avionics prices generally increased less than the CPI for the same 10-year period. For example, the average annual growth rate for DME's was higher than the CPI in only 1 year, 1978. By 1986, the average annual growth rate for prices over the 10-year period was 3.7 percent compared with 6.7 percent for the CPI. This situation is generally true for all the equipment except for ELT's. The price increase may be partially explained by the fact that when ELT's were first required by the FAA, a number of manufacturers jumped into the market to equip the large active fleet of general aviation aircraft, creating tough price competition. As the market began to taper off, many fringe manufacturers ceased production, enabling those in the business for the long term to increase their markup and improve profitability. Over the period under review, there has been very little change in FAA requirements for avionics other than some expansion in controlled air space around terminals. However, quality and capability of avionics have improved greatly over the last 10 years because of technological advances. The advent of digital electronics has resulted in a substantial reduction in cost of production, size and weight, and operating power requirements. These improvements have also resulted in an increase of the useful life of the equipment. In some cases, improved capability and smaller size have provided incentive for owners to purchase additional equipment for safety and convenience.

PILOT TRENDS

For the period 1980 through 1988, the number of student pilots fell from 210,180 to 146,016, a decline of 4.5 percent a year. In 1988, it declined 2.8 percent. During the 1960's and 1970's, the number of student pilots generally followed changes in economic activity. This pattern, however, has not occurred in the 1980's. Periods of robust economic growth have not been accompanied by a resurgence of pilot training. Rapidly rising training costs, aircraft prices, and operating and maintenance costs are partly responsible for this phenomenon. The lack of a GI bill for pilot training and perhaps higher than average price increases in higher education have contributed to the reduced numbers of pilots. A fundamental change may be occurring in the tastes and preferences of consumers for flying. In the long term, this could have a far greater impact on the market than the real growth of aircraft prices and operating costs. A declining population of students and an accelerating attrition rate of private pilots have reduced the total number of private pilots over the last 8 years. From 1980 to 1988, the total number of active private pilots fell from 343,276 to 300,949, a yearly rate of decline of about 1.6 percent. Based on the relative stability of the number of student pilots for the last few years and the strong demand for airline transport pilots, the downward trends in the pilot populations are expected to turn around in 1989. Slow growth is anticipated for the remainder of the forecast period.

GENERAL AVIATION FORECASTS

HOURS FLOWN

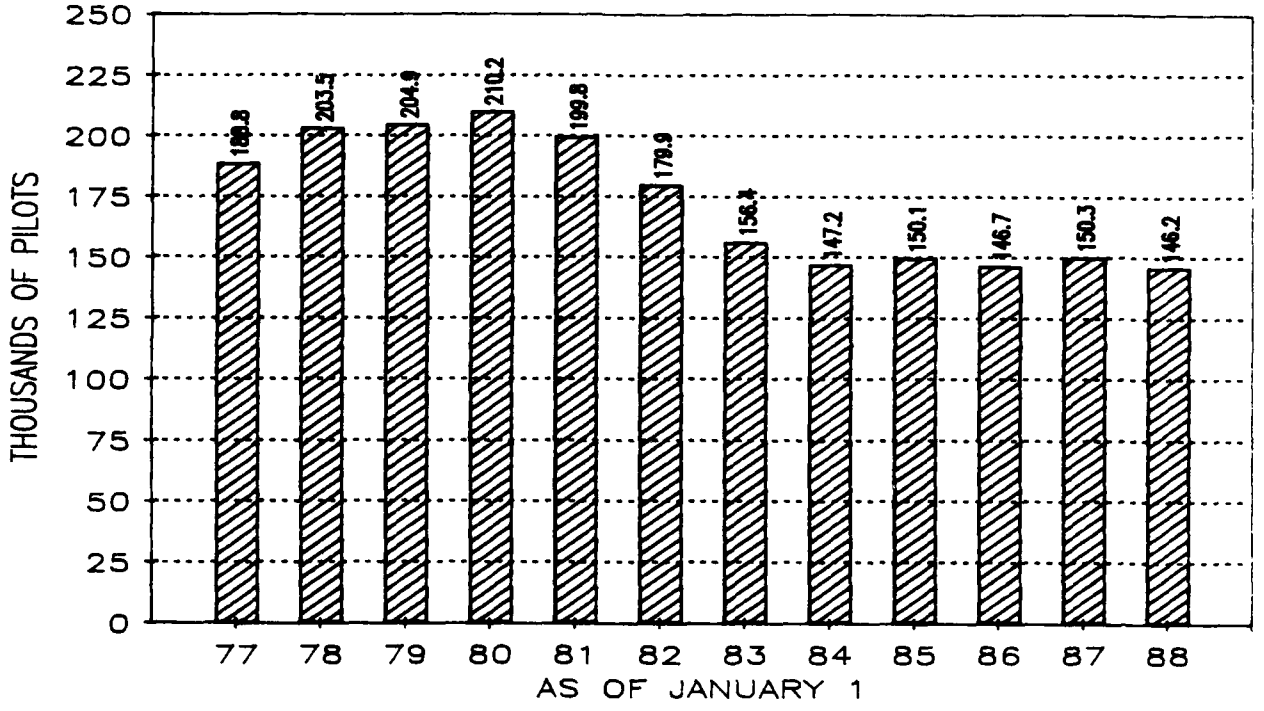
Growth over the entire forecast period for general aviation hours is expected to average only 1.2 percent a year, resulting in an estimated 38.6 million hours flown in the year 2000. During the 1960's and 1970's, the average annual growth rate of hours flown was about 6.0 percent. Single engine piston aircraft hours flown is forecast to increase from 22.1 million hours in 1988 to 23.0 million in the year 2000. Turbine-powered aircraft hours flown is projected to increase from 3.9 million in 1988 to 5.5 million in the year 2000, growing at the rate of 2.9 percent a year. Turbine rotorcraft hours flown is expected to increase at a yearly rate of 5.2 percent.

FLEET

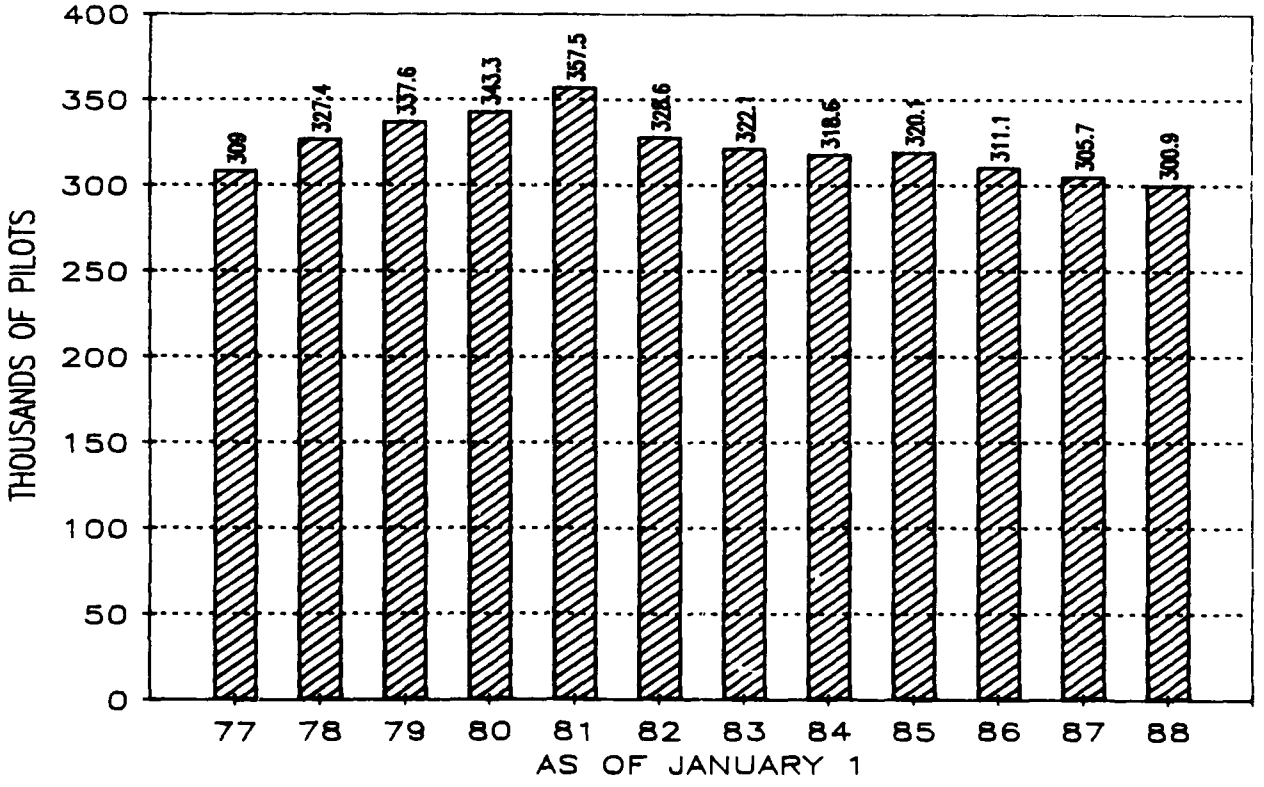
The active general aviation fleet will decline from 1988 through 1992, remain constant in 1993, and then grow slowly for the remainder of the forecast period. The population of active aircraft is forecast to increase only slightly over the 12-year period with a decline of 0.1 between 1988 and 1992, and a 0.3 percent growth from 1992 to the year 2000. Active single engine piston aircraft is projected to decline at an annual rate of 0.4 percent,

ACTIVE PILOT TRENDS

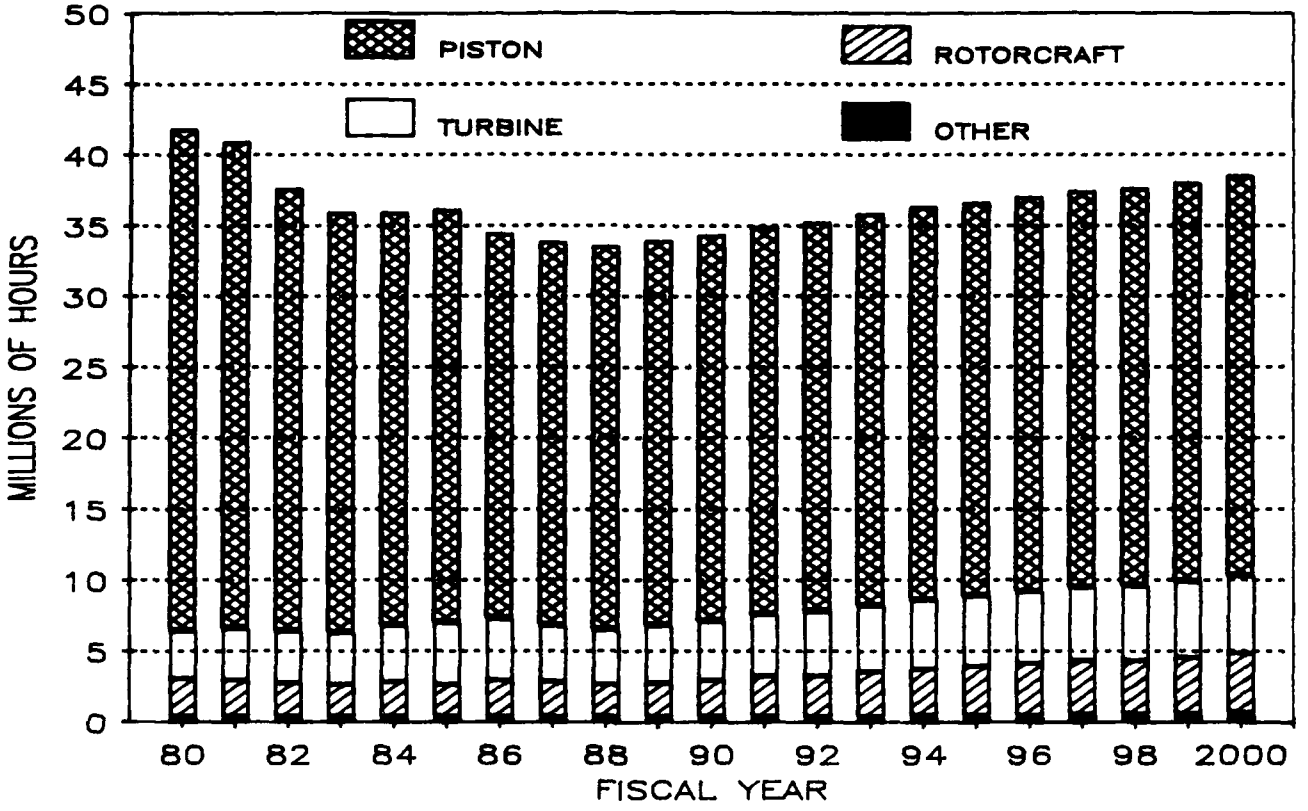
STUDENT PILOTS



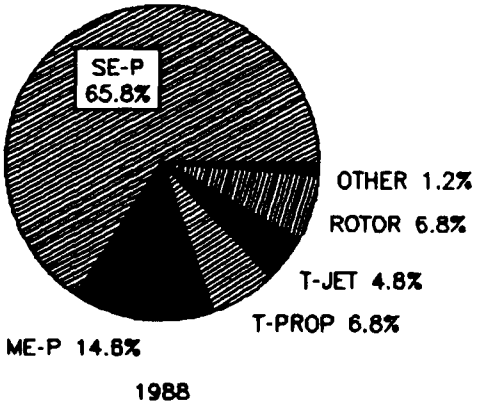
PRIVATE PILOTS

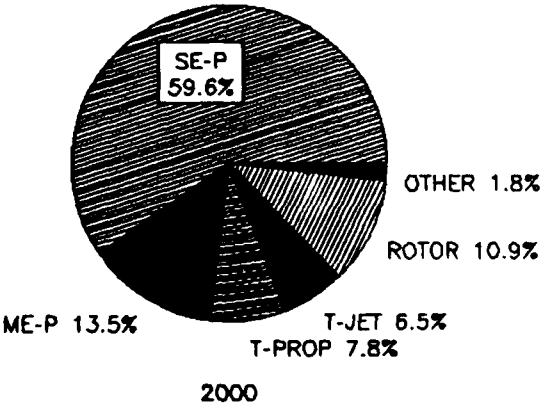


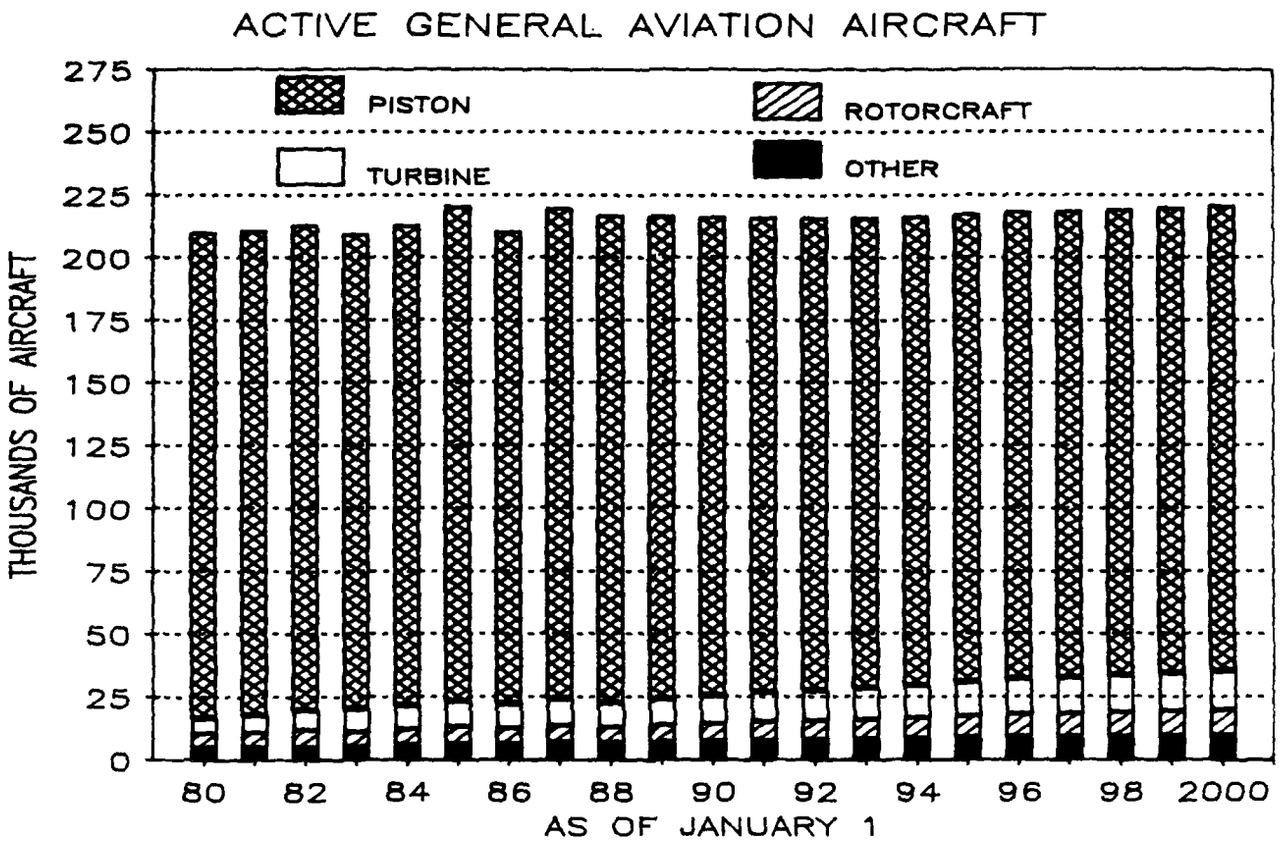
GENERAL AVIATION HOURS FLOWN



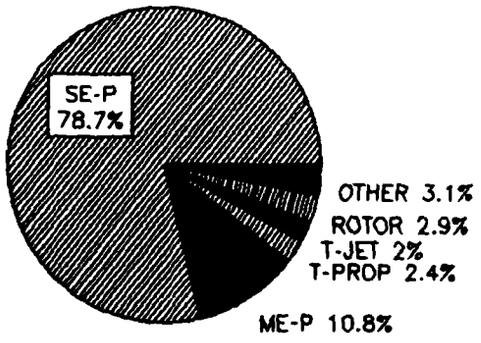
PERCENT BY AIRCRAFT TYPE



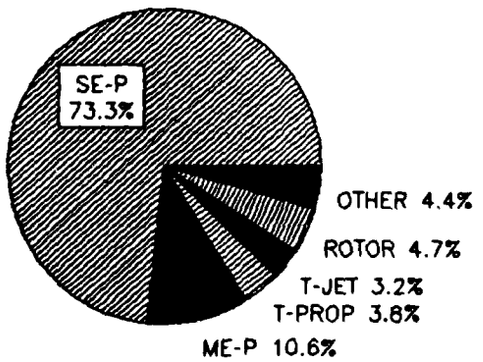




PERCENT BY AIRCRAFT TYPE



1988



2000

falling from 171,000 in 1988 to 162,000 in the year 2000. The number of multi-engine piston aircraft is expected to decline through 1993, and then to increase at about 100 aircraft per year until the total reaches the present level of 23,400. Turbine-powered aircraft is projected to increase from 9,700 in 1988 to 15,600 in the year 2000, growing at the rate of approximately 4.0 percent a year. The forecast of the turbine rotorcraft fleet shows a yearly rate of increase of 4.2 percent.

CHAPTER VI
HELICOPTERS

CHAPTER VI
HELICOPTERS

REVIEW OF 1988

SHIPMENTS

Preliminary data for calendar year 1988 indicate that shipments of United States civil helicopters will total 339 units that will be valued at $223 million. The number of helicopters and their value are 5.3 percent and 19.5 percent lower, respectively, than in 1987. Production for export in the helicopter industry made a net contribution of $101 million in reducing the trade deficit. However, this net contribution was lower than the previous year's sum of $160 million. Exports of civil helicopters fell to $202 million; imports increased to $101 million. Helicopter shipments have declined from the 1980 level of 1,366 units.

Key factors responsible for the depressed state of the helicopter manufacturing industry include the oil glut, low levels of offshore oil production and exploration, and an ample supply of used helicopters. In addition, a number of operators have been upgrading their helicopter fleets with units that out perform older models in range, speed, and capacity. The effect of such upgrading is a gain in efficiency; fewer helicopters can perform a greater number and variety of tasks than those performed prior to upgrading. The end result has been a lowering of the demand for new civil helicopters. The growing use of helicopters for emergency medical services and police- and weather-related work has helped to cushion the decline in the helicopter manufacturing industry.

The technology for a military tiltrotor aircraft has been demonstrated successfully and such aircraft are on order for the armed forces. It is anticipated that a modified version of the tiltrotor aircraft will be introduced into the civilian market by the turn of the century. The aircraft functions as a helicopter on takeoffs and landings and is capable of flying at a cruise speed of 300 knots per hour at an altitude of 20,000 to 25,000 feet as a conventional fixed-wing aircraft.

In theory, use of the tiltrotor aircraft in significant numbers has the potential to enhance the capacity of currently congested airports and airspace such as the Northeast Corridor of the United States. However, the tiltrotor aircraft, with its unique operating capabilities, may require extensive specialized communications, surveillance, and navigation equipment in order to realize its potential for providing significant capacity enhancement. FAA is investigating various scenarios or environments that may be conducive to the introduction of the tiltrotor aircraft in the civilian market. The development and deployment of the specialized equipment required by tiltrotor aircraft, coupled with the construction of additional heliports, will stimulate the use of helicopters in the transportation industry.

FLEET AND HOURS FLOWN

As of January 1, 1988, there were approximately 6,300 active civil rotorcraft in the United States, about 8.7 percent less than the 6,900 active helicopters in January 1987. Year-to-year fluctuations in the active rotorcraft fleet are the combined results of statistical estimating procedures and national economic conditions. During recessionary periods, specific helicopter units (for example, those that might be used marginally during economic growth and recovery conditions) are relegated to the inactive category. Such shifts are responsible, in part, for the observed variations in the active fleet.

Active turbine helicopters numbered 3,500 in 1988, approximately 55.6 percent of the active fleet. The proportion of active turbine helicopters decreased slightly in 1988 relative to the 1987 proportion (58.0 percent). By comparison, the number of active piston-powered rotorcraft (2,800) has remained virtually the same since 1985. Although the number of piston-powered helicopters increased in 1984 and 1985, the number has not climbed to the peak of 3,300 observed in 1982.

Rotorcraft flew an estimated 2.3 million hours in 1988. Turbine-powered rotorcraft flew 1.6 million hours, 69.6 percent of the total number of hours flown. The number of hours flown by both turbine-powered and piston-powered rotorcraft remained unchanged in 1988 relative to the final estimates for 1987.

HELICOPTER FORECASTS

The forecasts of rotorcraft fleet and hours flown presented in this section were derived from econometric models and time series analysis. The results reflect recently compiled benchmark data for calendar year 1987 and recent and anticipated economic conditions in the industry. The forecasts were developed by user category (executive, business, personal, etc) and were added to obtain the national total. The independent variables used included the cost of owning a helicopter, total employment, and the cost of oil and gas relative to other prices. One of the underlying assumptions is that the real cost of fuel will increase. As this occurs, increased petroleum production and exploration will be profitable. This, together with increased use of helicopters in the general economy, will lead to an increase in the fleet and in hours flown.

FLEET AND HOURS FLOWN

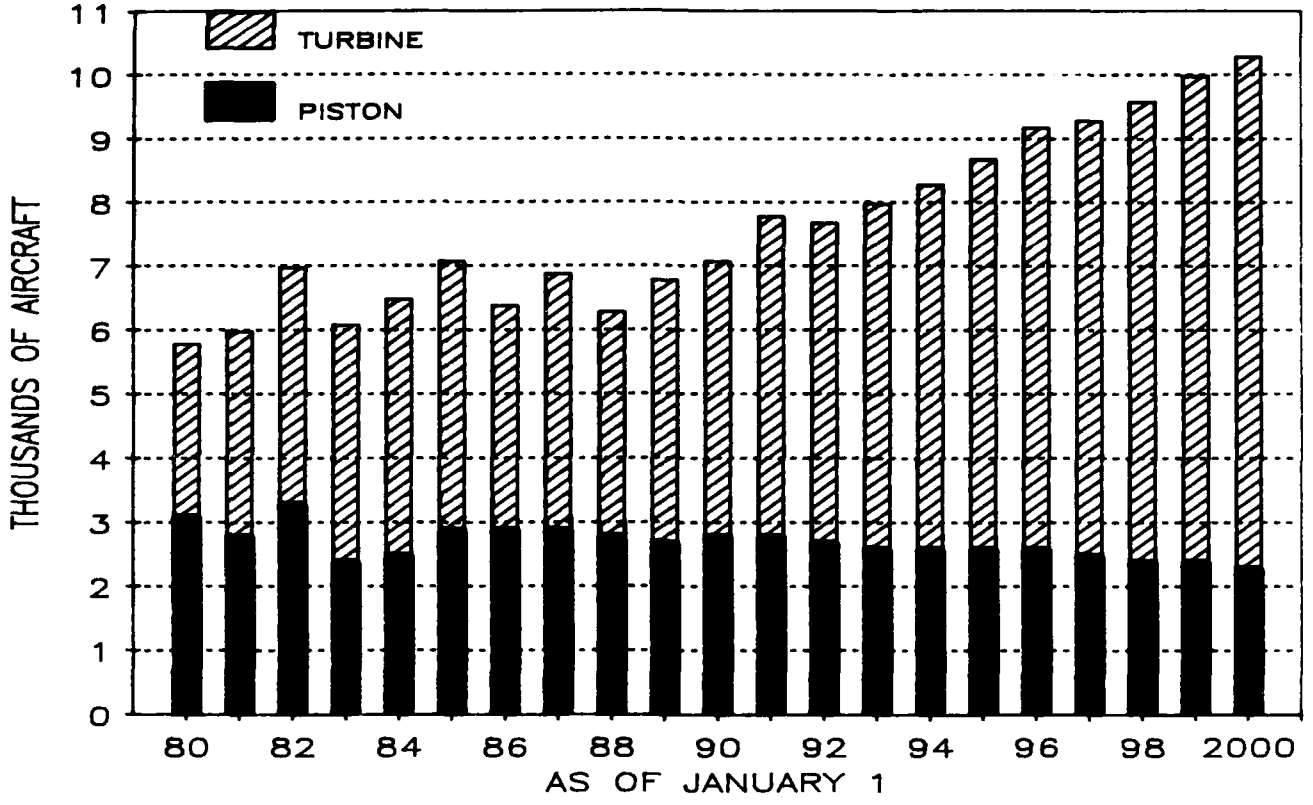
The active rotorcraft fleet is expected to reach 10,300 in the year 2000, an annual average increase of 4.2 percent over the 1987 level. In 2000, the turbine-powered portion of the fleet will number 8,000. This portion of the fleet will increase to 77.7 percent from the 1988 proportion of 55.6 percent. The piston-powered fleet will decrease to 2,300 from its current level of 2,800 helicopters.

The growth in the fleet will be accompanied by growth in hours flown which will reach 4.2 million in 2000. This represents an annual average growth of 5.1 percent. Hours flown by turbine-powered helicopters will increase by over 137.5 percent and will reach 3.8 million by 2000. In contrast, hours flown by piston-powered rotorcraft will decline by 42.9 percent, from 700,000 hours in 1988 to 400,000 hours in 2000.

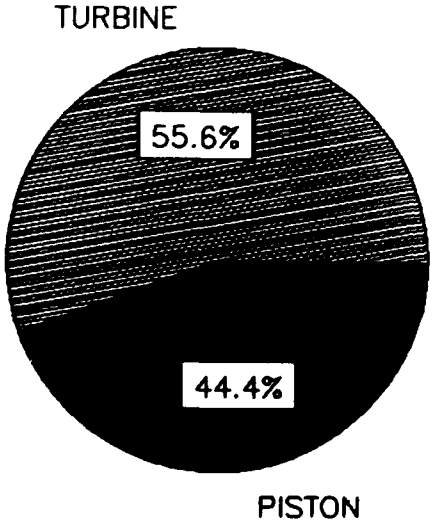
FUEL CONSUMED

In 1988, fuel consumed by rotorcraft totaled 65.5 million gallons. By 2000, fuel consumed will increase to 137.3 million gallons, an average annual increase of 6.4 percent. Nearly 95.8 percent of the fuel consumed in 2000 will be used by turbine-powered rotorcraft compared with about 84.6 percent in 1988.

ACTIVE ROTORCRAFT



PERCENT BY AIRCRAFT TYPE



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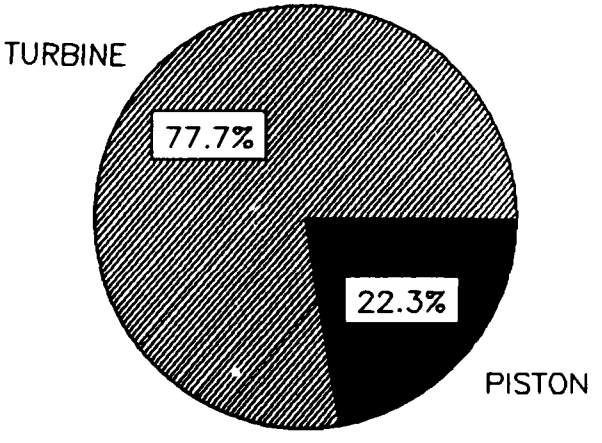

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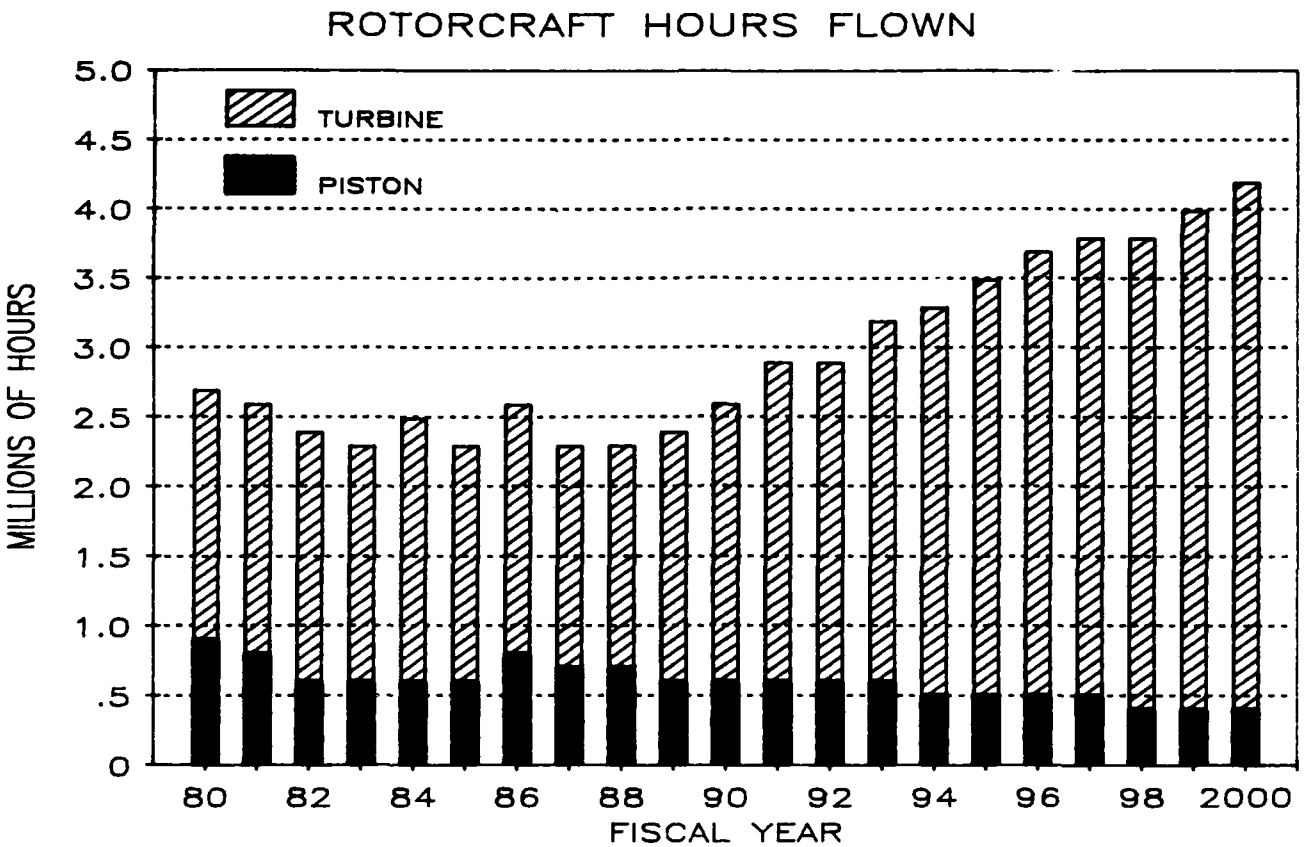
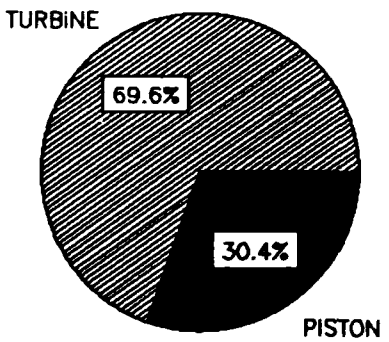
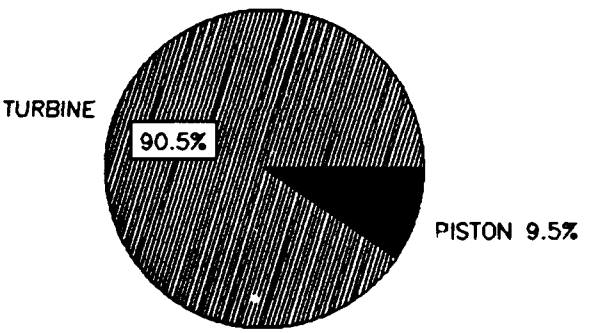


PERCENT BY AIRCRAFT TYPE



1988



2000

CHAPTER VII

FAA WORKLOAD MEASURES

CHAPTER VII
FAA WORKLOAD MEASURES

The FAA provides the aviation community with three distinct operational services: (1) air traffic control at selected airports, (2) traffic surveillance and aircraft separation by Air Route Traffic Control Centers, and (3) flight planning and pilot briefings at Flight Service Stations. All four aviation system user groups--air carriers, commuters/air taxis, general aviation, and military--utilize these FAA operational services to enhance aviation traffic safety.

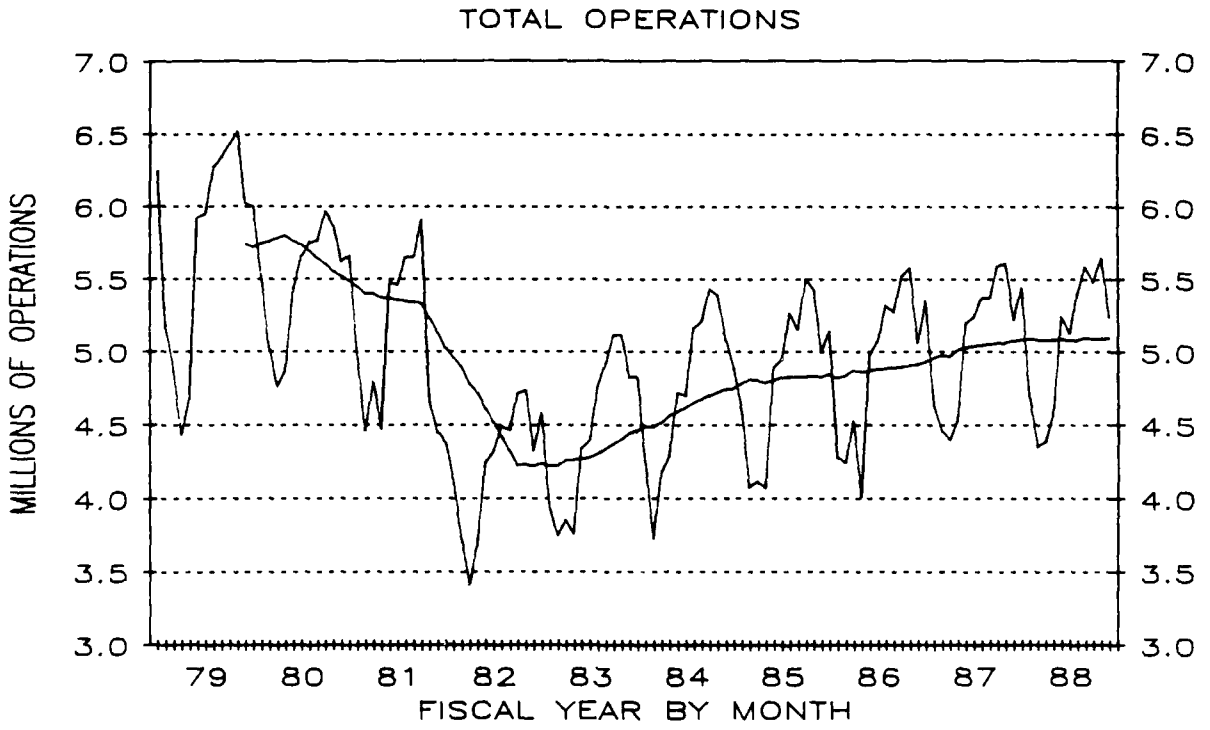
Multiple indicators are used to describe the total FAA operational workload. The four aviation system user groups differ in the demands they impose on the air traffic system. Consequently, no single measure typifies past trends or future demand for the services provided by the FAA. There have been, and will continue to be, different socioeconomic forces driving the growth of each of the aviation-user categories.

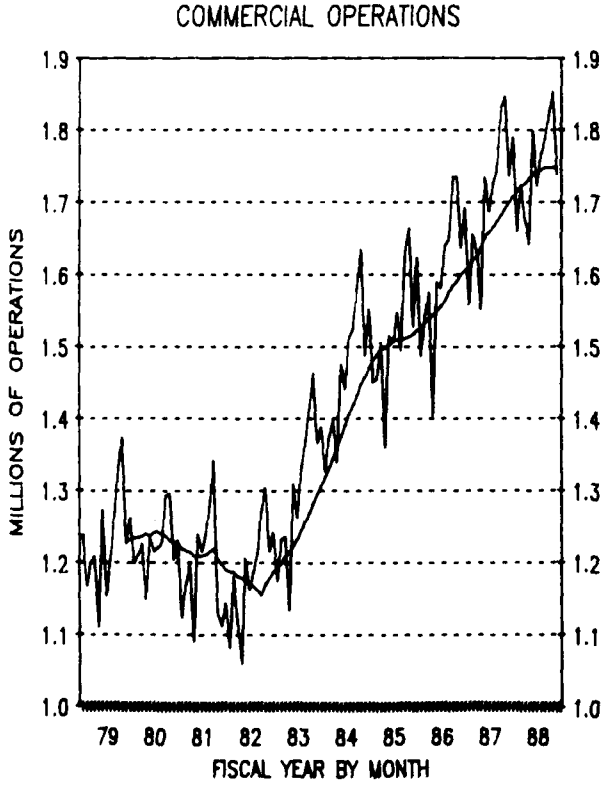
REVIEW OF 1988

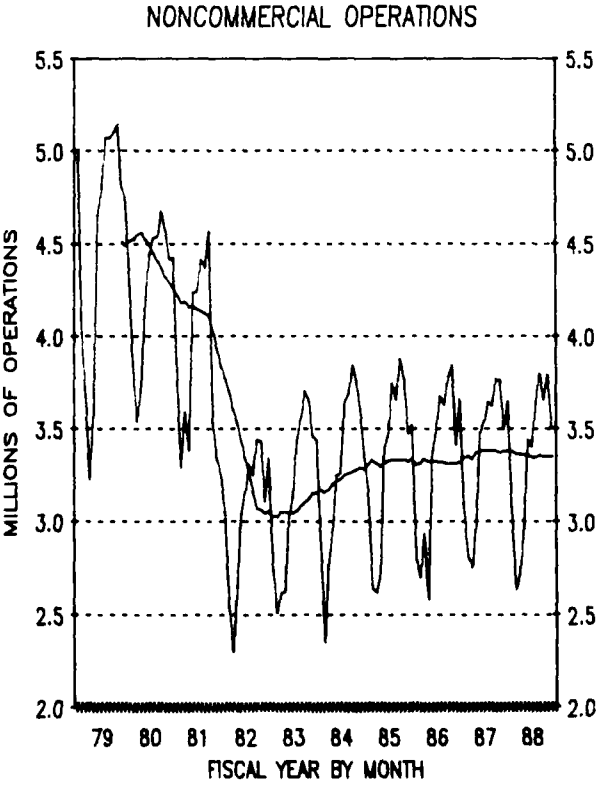
FAA TOWER ACTIVITY

Aircraft activity at the 399 FAA towered airports increased only slightly in fiscal year 1988. The 61.2 million operations recorded in 1988 represent only a 0.4 percent increase over the 61.0 million operations recorded in fiscal year 1987. This slowdown in 1988 followed 5 consecutive years of strong growth, a period during which operations at FAA towers increased by 20.4 percent (3.8 percent annually). Despite the strong growth achieved since 1982, the level of activity recorded at FAA towered airports in 1988 is 4.3 percent below the operation counts of the 12-month period immediately preceding the August 1981 air traffic controllers' strike (hereafter referred to as the pre-strike period).

TOWERED AIRPORT OPERATIONS
ACTUAL AMD 12-MONTH MOVING AVERAGE







The majority of the growth in activity since 1982 has been the result of the strong demand for commercial aviation services. Commercial activity (defined herein as the sum of air carrier and commuter/air taxi operations) has increased by 48.9 percent since 1982, 2.9 percent in fiscal year 1988. On the other hand, noncommercial activity (the sum of general aviation and military operations) has increased by only 10.1 percent since 1982. Noncommercial activity at FAA towered airports declined by 0.8 percent in fiscal year 1988.

Air carrier operations at FAA towered airports totaled 12.7 million in fiscal year 1988, 2.6 percent less than the 13.1 operations recorded in 1987. This decline in air carrier activity, following increases averaging over 7.5 percent annually between 1982 and 1987, is thought to be a one-time aberration that was largely the result of two scheduling decisions by airline management. The first involved a shift of capacity to the longer haul international routes. While this decision did result in a considerable increase in international departures (up 15.8 percent in 1988), it had little impact on the overall operations' count since international operations accounted for only 5.0 percent of total U.S. air carrier departures in 1988. In addition, airline management also decided to increase published scheduled flight times to improve its on-time performance. Both of these decisions had the effect of reducing aircraft utilization (average hours flown per aircraft per day), and the impact was more noticeable on domestic departures, which declined by 0.3 percent in fiscal year 1988.

The fastest growing user group continues to be the commuter/air taxi carriers. Commuter/air taxi activity has increased in every year but one (1986) since the user category was first designated in 1972. Over the past decade, commuter/air taxi activity at FAA towered airports has grown at an average annual rate of 8.1 percent. In fiscal year 1988, commuter/air taxi operations totaled 8.3 million, a 12.6 percent increase over 1987 activity levels. Most of the growth by this user group is the direct result of commuter code-sharing and schedule tie-in agreements with the larger commercial air carriers.

General aviation activity at FAA towered airports declined by 1.0 percent in fiscal year 1988. While general aviation activity has increased in four of the seven years since the 1981 air traffic controller's strike, this segment of the aviation community has, for the most part, not responded to current economic expansion which began in 1983. The 37.4 million operations recorded in 1988 is equal to only 79.6 percent of general aviation's pre-strike level of operations. Itinerant general aviation operations (22.1 million) declined by only 0.2 percent in 1988. Unfortunately, local general aviation operations (15.4 million) were down 2.3 percent from 1987 activity levels. Based on fiscal year 1988 operations, itinerant operations are at 80.3 percent of pre-strike activity levels, local operations at 79.9 percent.

Military operations totaled 2.8 million in fiscal year 1988, 1.8 percent above 1987 levels. Itinerant military operations (1.4 million) increased by 2.5 percent in 1988 while local military operations (1.4 million) grew by 1.1 percent in 1988.

INSTRUMENT OPERATIONS

Instrument operations handled at FAA towers totaled 44.2 million in fiscal year 1988, 2.0 percent above the 1987 activity level and 14.0 percent above the level of activity recorded in the pre-strike period. Most of the increase can be attributed to the increase in commercial aircraft activity (up 3.5 percent), particularly to commuter code-sharing and schedule tie-in agreements with the larger commercial air carriers. Commuters/air taxi operations totaled 8.4 million (up 14.9 percent) in 1988; however, air carrier instrument operations totaled only 13.4 million (down 2.6 percent) over the same time period.

Noncommercial instrument operations increased slightly in fiscal year 1988, up 0.5 percent over 1987 activity levels. General aviation activity totaled 18.1 million (up 1.2 percent) while military operations declined by 2.3 percent, totaling 4.3 million, Most of the increase, however, can be attributed to the formation of Airport Radar Service Areas (ARSA's) at 137 locations in the United States. Under the previous Terminal Radar Service Area (TRSA) concept, general aviation aircraft could enter the TRSA without communicating with Air Traffic Control (ATC). However, under the ARSA concept all aircraft must be in contact with ATC.

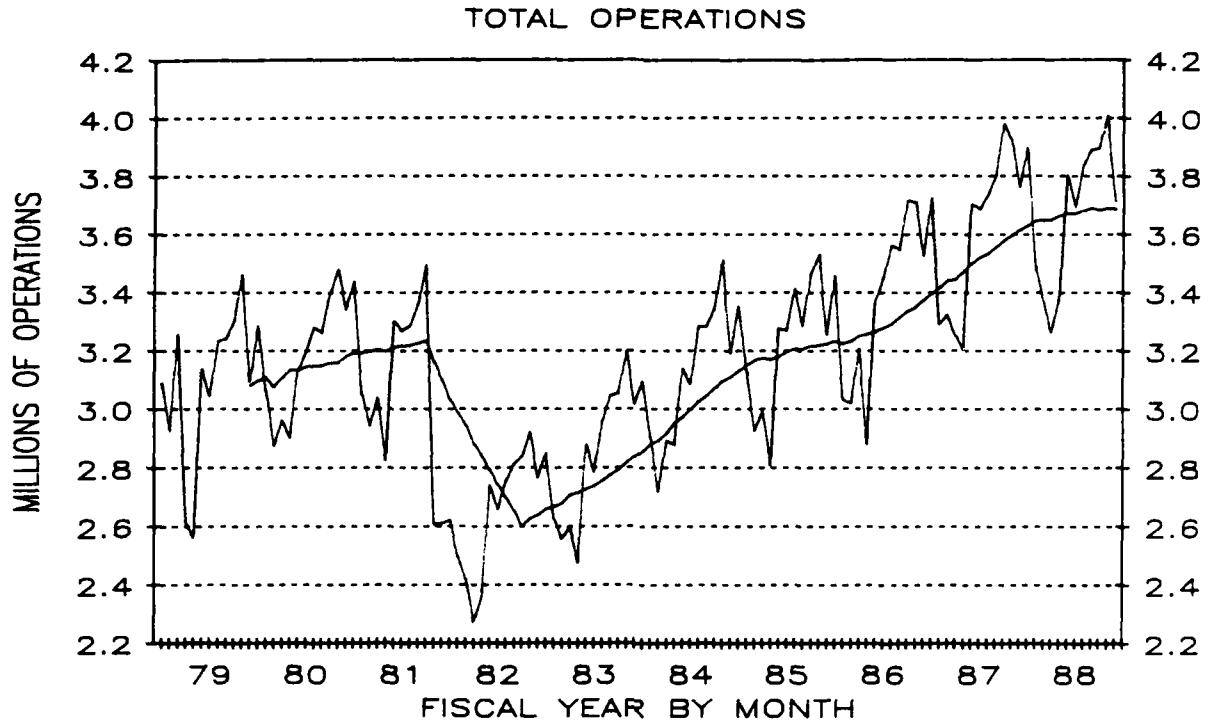
CENTER ACTIVITY

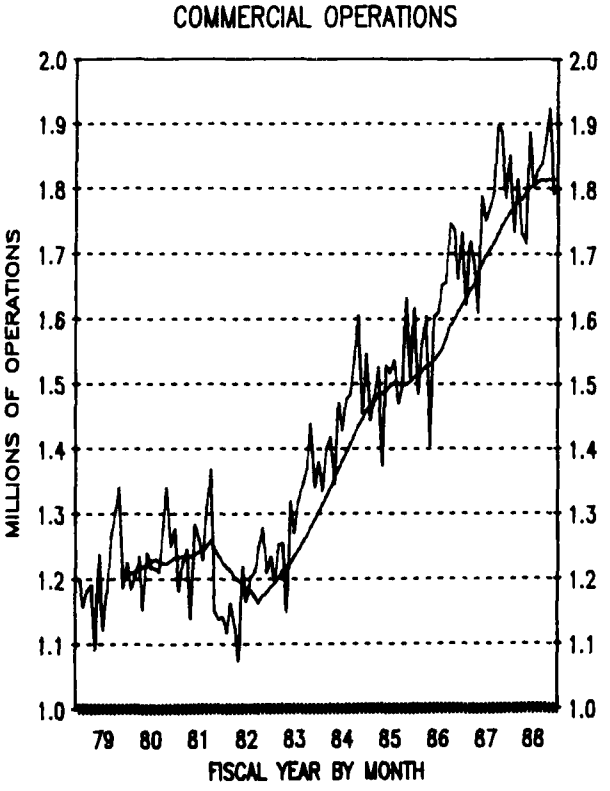
In fiscal year 1988, the number of aircraft flying under instrument rules handled by FAA Air Traffic Control Centers' personnel totaled 36.2 million, an increase of 1.0 percent over 1987. Most of the increase at the Centers can also be attributed to the growth in commercial aviation activity. Commercial aircraft handled at the Centers increased by 5.3 percent compared with a decline of 6.1 percent in the number of noncommercial aircraft handled. The number of air carrier aircraft handled totaled 17.8 million (up 3.9 percent), while the number of commuter/air taxi aircraft handled totaled 5.8 million (up 9.9 percent). Military aircraft handled (4.6 million) declined by 13.8 percent in fiscal year 1988, while the number of general aviation aircraft handled (8.0 million) declined by 1.3 percent.

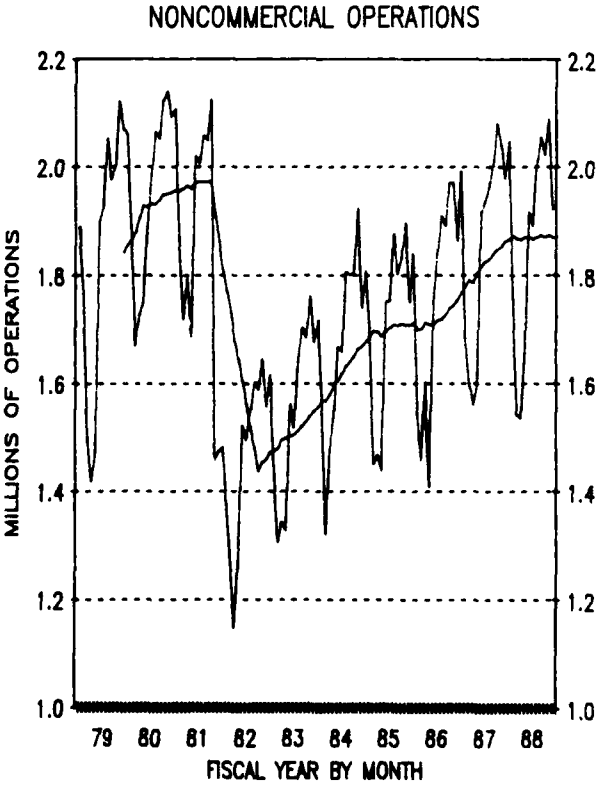
FLIGHT SERVICE STATION ACTIVITY

User demand at Flight Service Stations (FSS's)--pilot briefings, flight plans, and aircraft contacted--totaled 44.7 million in fiscal year 1988, down 6.3 percent from 1987. User demand declined for all three of the flight service categories in 1988: the number of pilot briefings (11.6 million) declined 8.9 percent, the number of aircraft contacted (6.4 million) declined 7.8 percent, and the number of flight plans originated (7.6 million) declined by 1.5 percent. During 1988, one automated FSS was commissioned, bringing the total to 41. Also in 1988, 31 FSS's were consolidated into the automated FSS's for a total of 337 facilities at the end of the year.

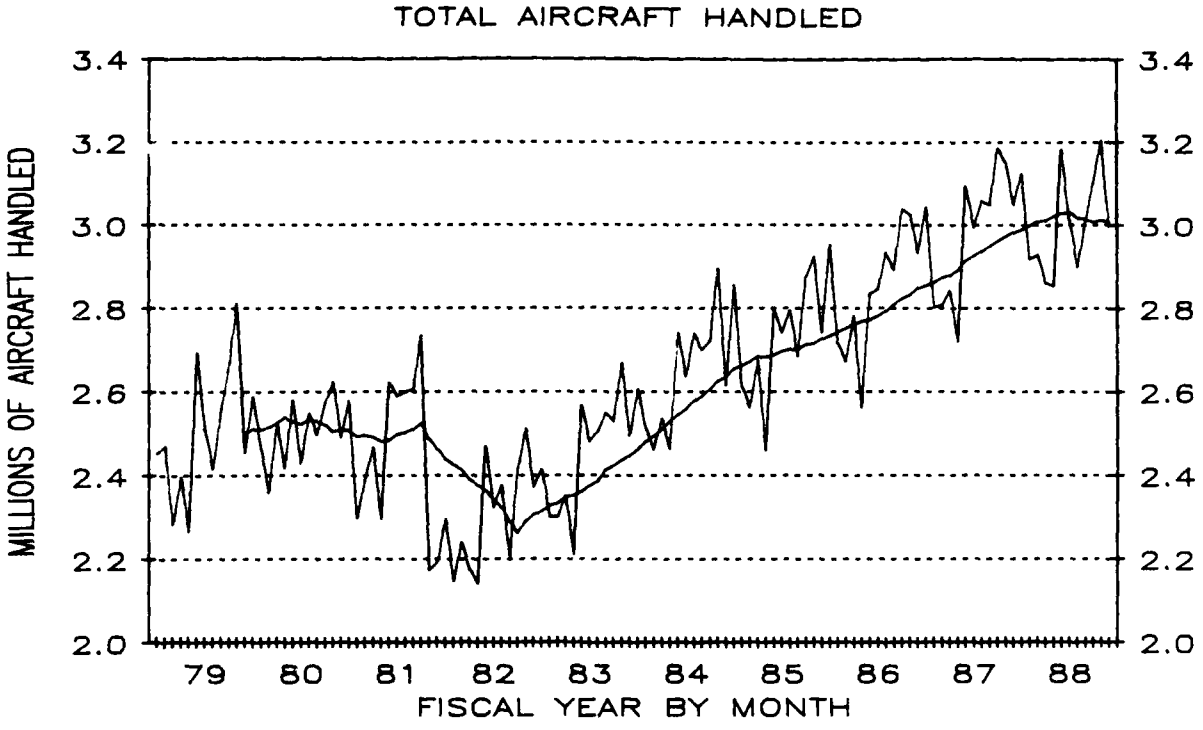
INSTRUMENT OPERATIONS
ACTUAL AND 12-MONTH MOVING AVERAGE

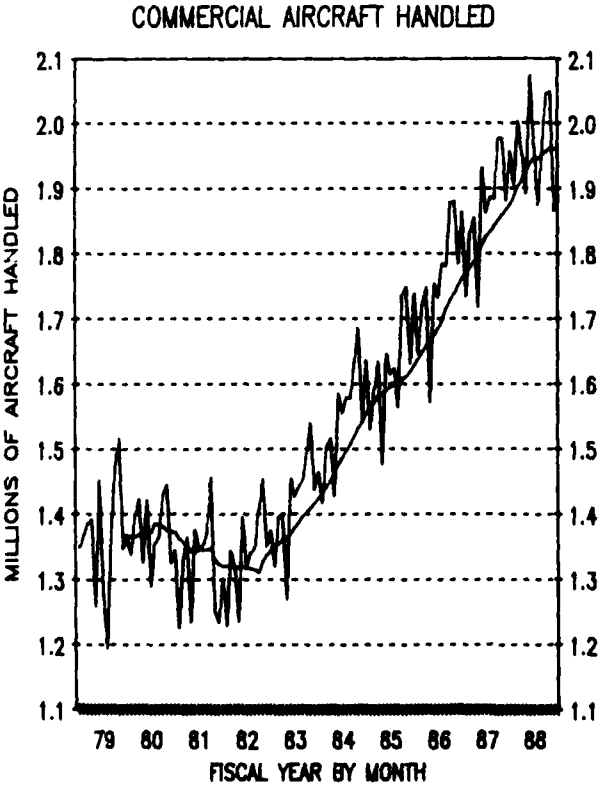


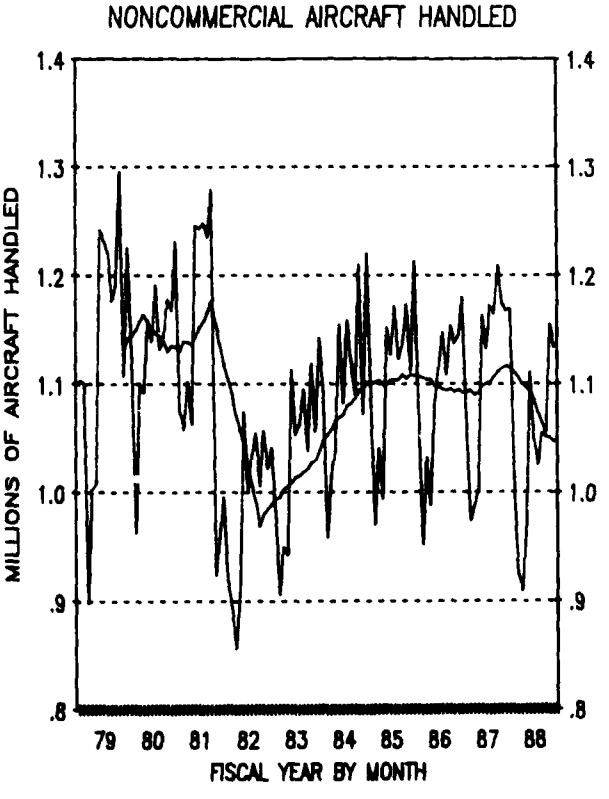




IFR AIRCRAFT HANDLED
ACTUAL AND 12-MONTH MOVING AVERAGE







CONTRACT TOWERS

The FAA is currently contracting out "low activity towers", and the operation counts at these locations are no longer included in the FAA tower workload measures. There were 17 contract towers in operation in fiscal year 1988, 3 more than in fiscal year 1987. Operations at contract towers totaled 876,354 in fiscal year 1988, an increase of 9.5 percent over the number of operations recorded at contract towers in 1987. General aviation accounted for the vast majority (85.5 percent) of the activity at these contract towers, up 8.7 percent to 749,064 operations. Commuter/air taxi operations totaled 76,585 (up 21.9 percent) while military operations totaled 46,230 (up 6.8 percent). Air carrier operations at contract towers totaled 4,475 in fiscal year 1988, 13.7 percent below the 1987 activity level.

A list of the current 17 contract towers is included in Appendix G. Operation counts for individual FAA and contract towers, by user group, can be found in the publication FAA Air Traffic Activity FY 1988, compiled by the FAA's Office of Management Systems (AMS-420).

FORECAST ASSUMPTIONS

NUMBER OF FAA FACILITIES

Growth in FAA workload measures includes not only the demand imposed on the National Airspace System, but also aviation activity at those locations previously not provided FAA services. Conversely, aviation activity at contract towers is excluded from the workload measures.

The current forecast assumes that the number of FAA towered airports will remain constant at the 399 control towers in operation in fiscal year 1988. There are currently 23 Terminal Control Areas (TCA's) and 93 ARSA's. This forecast assumes that there will be nine additional TCA's and 12 additional ARSA's added to the system over the next two years. This expansion of controlled airspace is reflected in the forecast for instrument operations at airports with FAA traffic control service.

Effective September 1988, the Honolulu Air Route Traffic Control Center (ARTCC) has been reclassified as a Center Radar Approach Control (CERAP). Aircraft activity at the Honolulu facility is no longer included in the center aircraft handled counts and is reflected in the forecast for IFR aircraft handled at FAA air route traffic control centers.

WORKLOAD FORECASTS

FAA TOWER ACTIVITY

Activity at FAA towered airports is expected to surpass the pre-strike level (64.0 million) in 1990 and will exceed the 1979 peak (69.0 million) in 1993. Operations at FAA towered airports are forecast to increase by 2.5 percent in 1989 and by 2.1 percent in 1990, and to average 2.3 percent over the 12-year forecast period. In absolute numbers, towered operations are projected to increase from 61.2 million in 1988 to 80.2 million in the year 2000.

The mix of aircraft using FAA towered airports is expected to remain fairly homogeneous over the forecast period. This results from the fact that the combined total of general aviation and commuter/air taxi operations (i.e., operations performed by smaller aircraft) is expected to grow at a slightly slower pace than the number of air carrier operations (31.9 percent compared with 34.6 percent). The combined activities of general aviation and commuters/ air taxis are expected to account for 75.2 percent of total tower operations in fiscal year 2000, up slightly from 74.7 percent in 1988. Air carrier operations' share of towered airport activity is also expected to increase slightly, from 20.8 percent in 1988 to 21.3 percent in the year 2000.

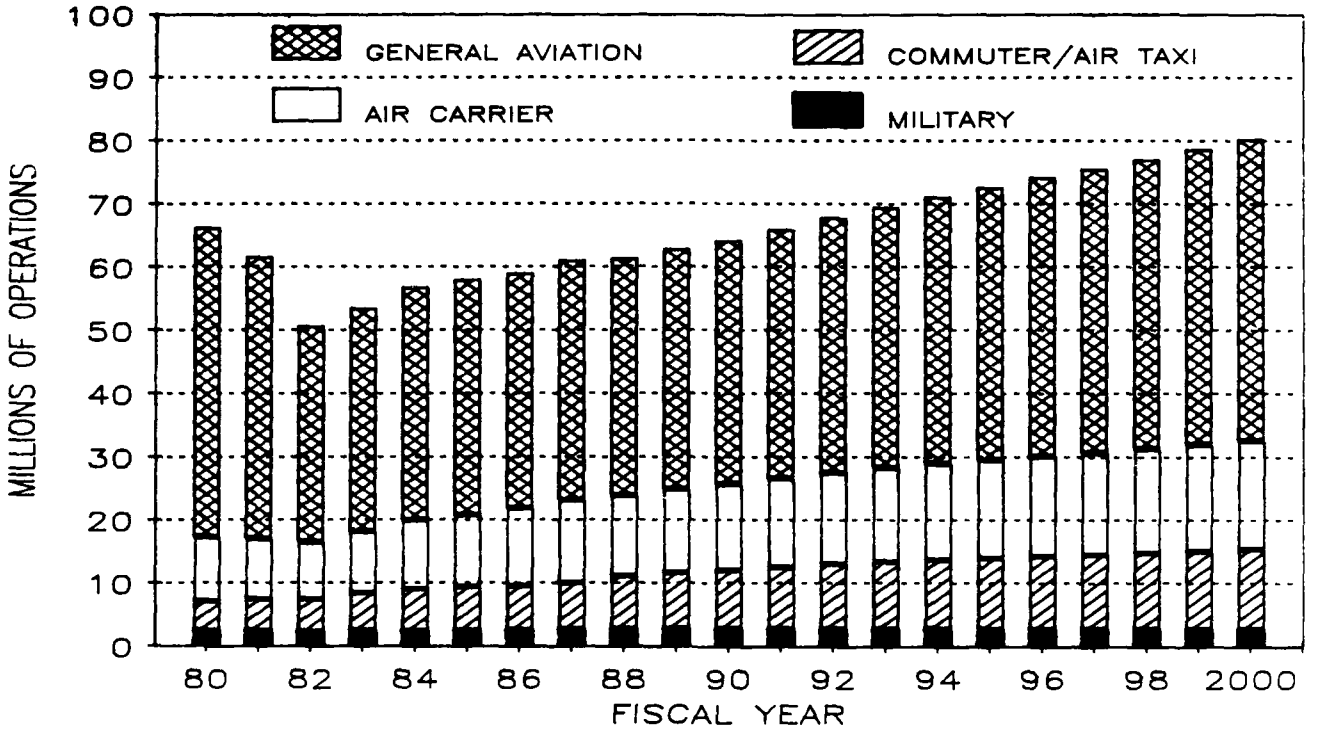
The forecasted average annual growth rate for each aviation user group from the year 1988 to the year 2000 is: commuter/air taxi, 3.5 percent; air carrier, 2.5 percent; and general aviation, 2.1 percent. Military operations are expected to remain constant at the 1988 level of activity. Commercial activity is expected to grow at an average annual rate of 2.9 percent over the 12-year forecast period while noncommercial activity is forecast to increase by 1.9 percent annually.

INSTRUMENT OPERATIONS

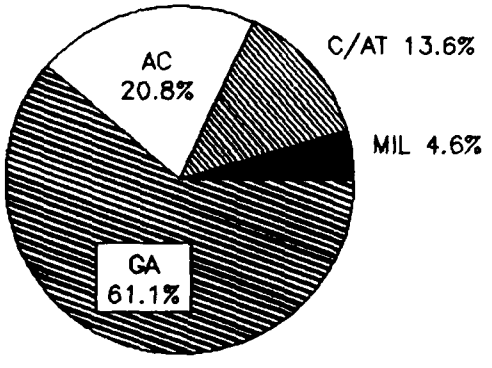
An increase in the number of TCA's and TRSA's in both 1989 and 1990 is expected to result in a fairly rapid increase in the number of instrument operations in the short-term. Instrument operations are forecast to grow by 3.6 percent in 1989 and by 4.1 percent in 1990. Over the entire 12-year forecast period, instrument operations are expected to increase at an average annual rate of 2.7 percent, growing from a total of 44.3 million operations in 1988 to 61.0 million in the year 2000.

The mix of instrument operations is expected to become more heterogeneous over the forecast period. The number of commuter/air taxi and general aviation operations performed by smaller aircraft is expected to increase at a substantially faster rate than the number of operations performed by the larger, more sophisticated air carrier aircraft (45.3 percent versus 35.8 percent). By the year 2000, 63.1 percent of all instrument operations are expected to be performed by commuter/air taxi and general aviation aircraft, up from 60.0 percent in fiscal year 1988.

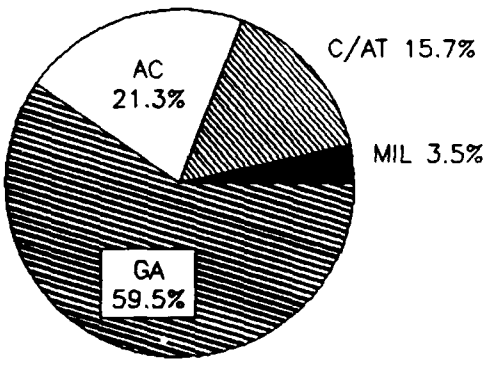
AIRCRAFT OPERATIONS AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP

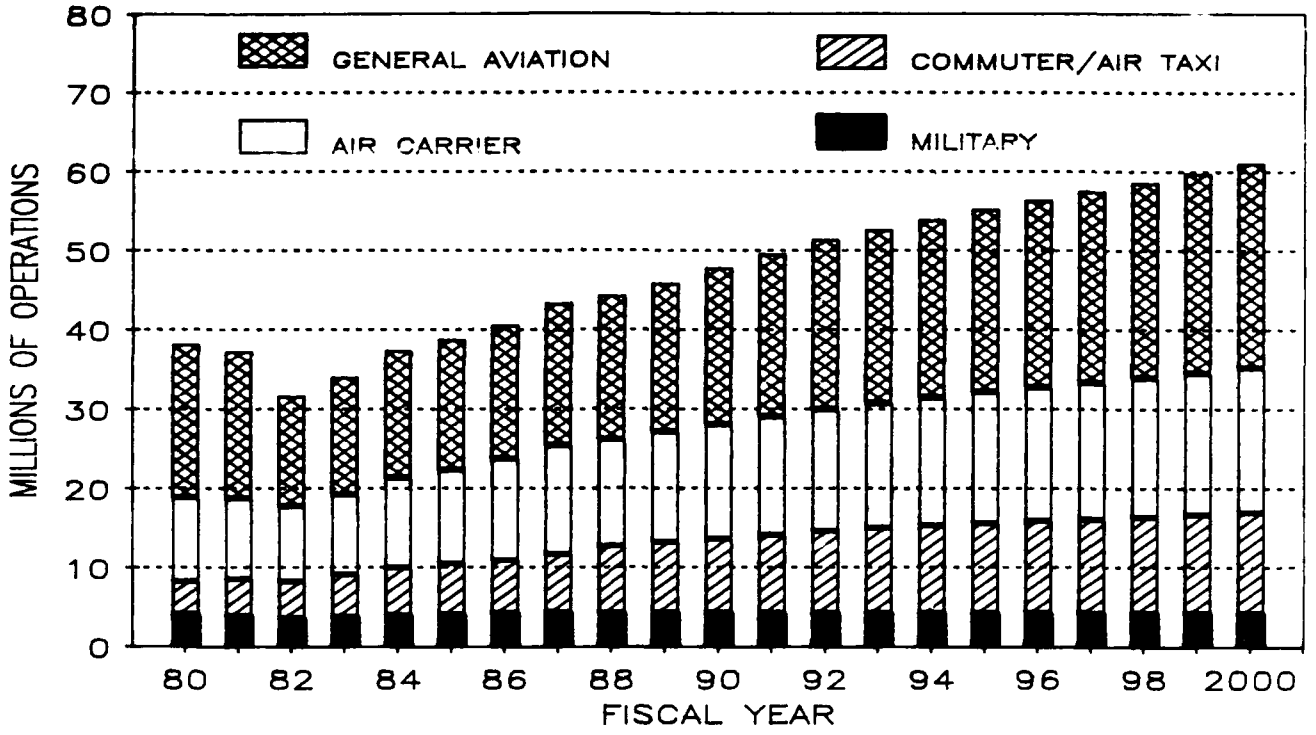


1988

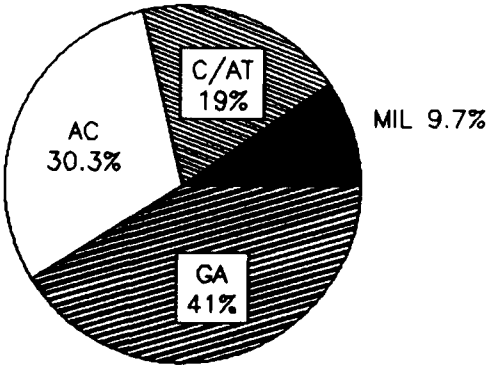


2000

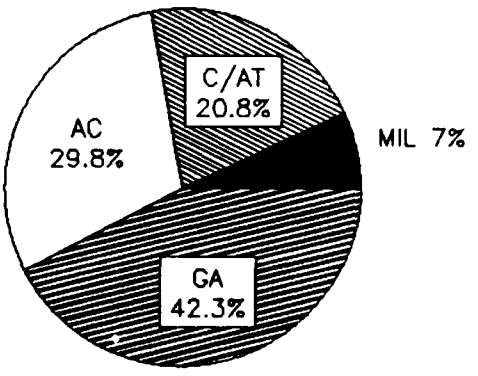
INSTRUMENT OPERATIONS AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP



1988



2000

The projected average annual growth rate for each user group is: commuter/air taxi, 3.5 percent; general aviation, 3.0 percent; and air carrier, 2.6 percent. Military operations are expected to remain constant throughout the forecast period. Over the 12-year forecast period, commercial activity is expected to increase at an average rate of 3.0 percent annually; noncommercial activity by 2.5 percent annually.

CENTER ACTIVITY

The workload at FAA Air Route Traffic Control Centers is expected to exhibit strong growth throughout the forecast period, increasing by 2.8 percent in 1989 and by 3.0 percent in 1990, and averaging 2.3 percent over the 12-year forecast period. In absolute numbers, the Center workload is forecast to increase from 36.2 million aircraft handled in 1988 to 47.8 million in the year 2000.

General aviation's share of the Center workload is expected to decline slightly over the forecast period, from 22.2 percent in 1988 to 21.6 percent in the year 2000. On the other hand, commercial activities share of Center workload is forecast to increase significantly over the same time period, from 65.2 percent to 68.6 percent. Between 1988 and the year 2000, air carrier's share is forecast to increase from 49.2 percent to 50.0 percent; commuter/air taxi's share from 16.1 percent to 18.6 percent.

The projected average annual growth rate by user group is: commuter/air taxi, 3.7 percent; air carrier, 2.5 percent; and general aviation, 2.2 percent. The number of military operations is expected to remain constant at the 1988 level of activity. Commercial activity is expected to grow at an average annual rate of 2.8 percent over the 12-year forecast period while noncommercial activity is forecast to increase by 1.5 percent annually.

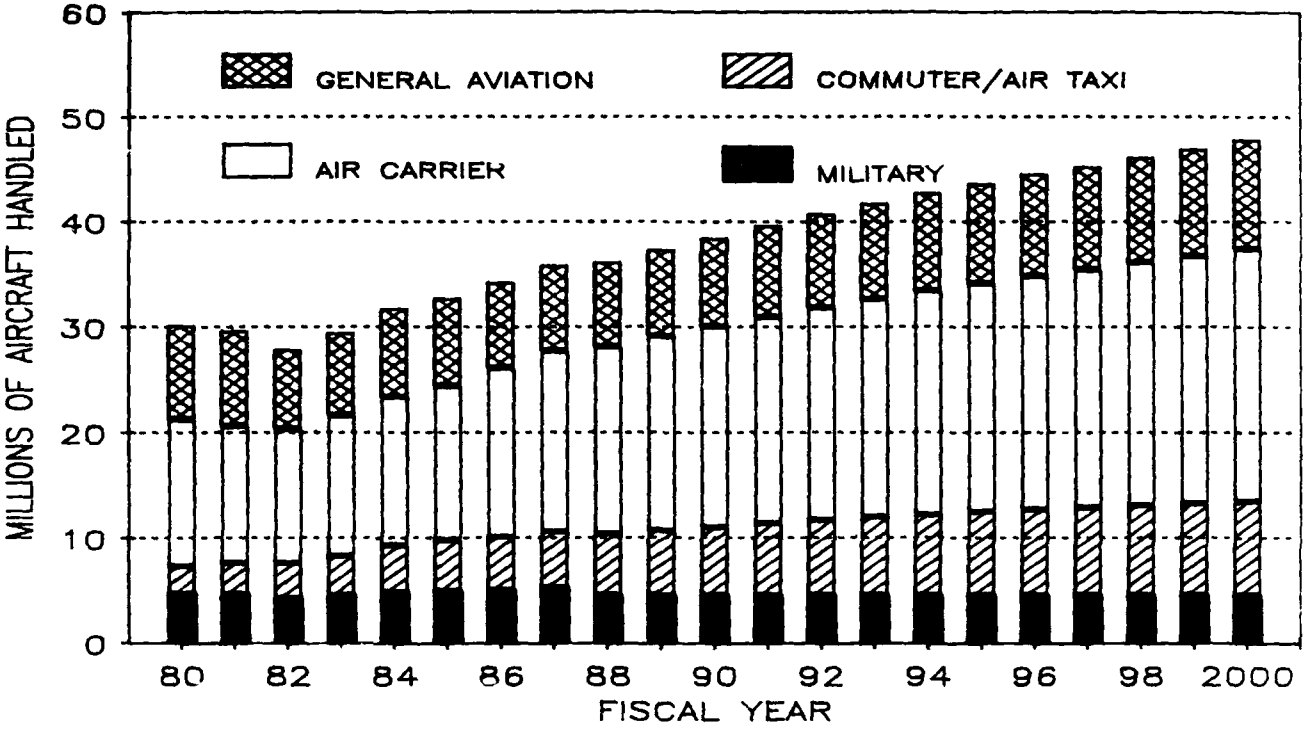
Forecasts for individual Centers are available upon request from the Forecast Branch, Office of Aviation Policy and Plans (APO-110).

FLIGHT SERVICE STATION ACTIVITY

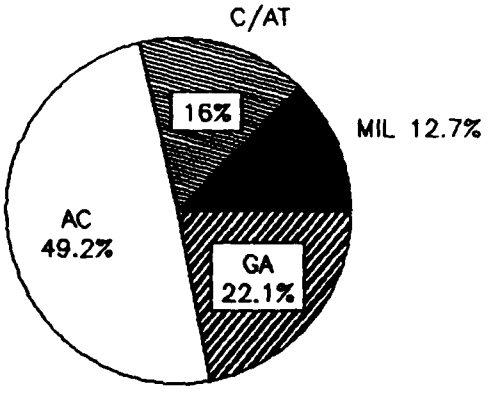
Total flight services originating at Flight Service Stations are projected to decline by 1.6 percent in fiscal year 1989, then increase by 0.5 percent in 1990, and to average 0.6 percent annual growth over the entire forecast period. In actual numbers, flight services rendered are forecast to increase from 44.7 million in 1988 to 48.2 million in the year 2000.

The number of pilot briefings is expected to increase from 11.6 million in 1988 to 11.8 million in the year 2000, an average annual growth rate of only 0.1 percent. The number of flight plans originated is forecast to increase at an average annual rate of 1.7 percent between 1988 and the year 2000, from 7.5 million to 9.2 million. The number of aircraft contacted is projected to decline over the 12-year forecast period, from 6.4 million in 1988 to 6.2 million in the year 2000.

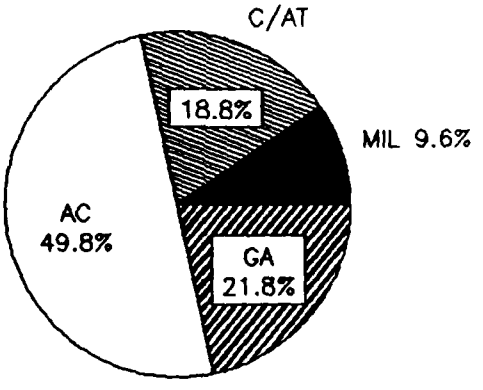
IFR AIRCRAFT HANDLED AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS



DISTRIBUTION OF WORKLOAD BY USER GROUP



1988



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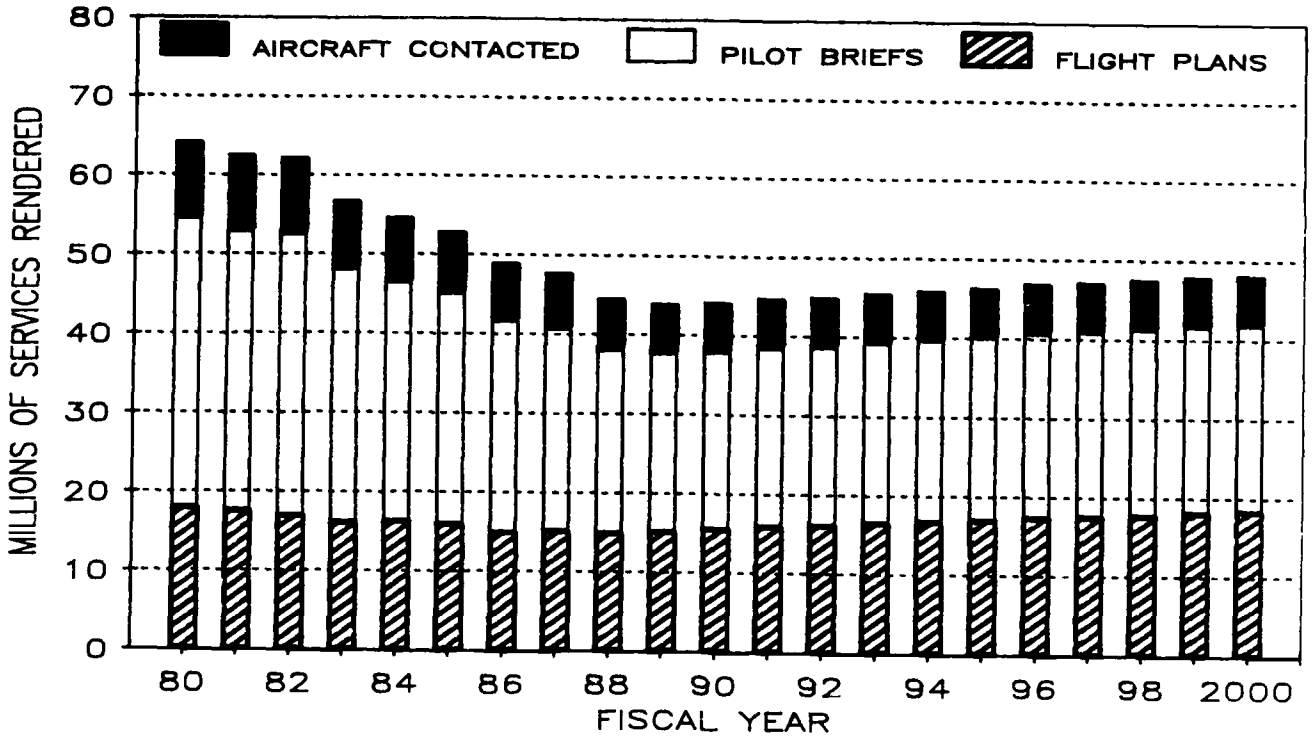
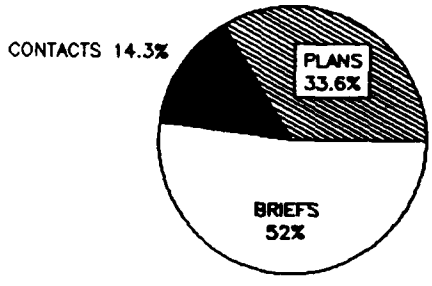
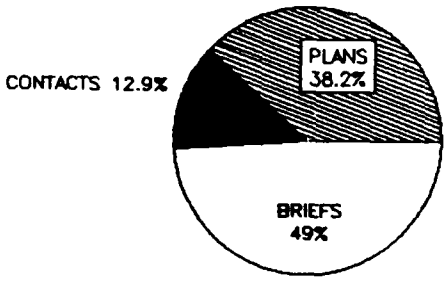
FLIGHT SERVICES ORIGINATED AT FAA FLIGHT SERVICE STATIONS



DISTRIBUTION BY TYPE OF SERVICE RENDERED



1988

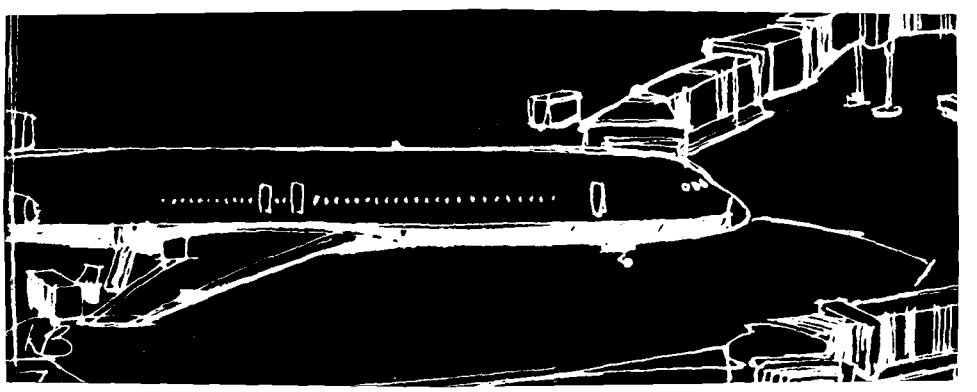


2000

It should be noted that the Flight Service Station (FSS) workload measures do not fully reflect the total level of services provided by the FSS system. This is a result of the impact of the FSS automation and consolidation program. The primary benefit of the program is improved productivity through automation of specialist's access to detailed briefing information and flight plan filing. To some extent the improved quality of pilot briefings reduces the need for multiple briefings as in the past. Also, pilots now have direct telephone access to flight planning information without dealing with a specialist. While the volume of pilot briefs provided through the TIBS (Telephone Information Briefing Service) service is not counted, it has increased significantly. Given that this service is not counted, the recent historical and projected FSS workload measures understate the level of pilot briefing services provided by the FSS system. Additionally, the consolidation of the FSS system from over 300 facilities into 61 facilities, by definition, reduces the number of aircraft contacts, even if general aviation activity remains unchanged or, to some extent, increases.

Additionally, user demand, as measured by total flight services, is not indicative of the total workload of the flight service station system. For example, a substantial amount of time is devoted to the preparation of recorded weather briefing data and to the processing and dissemination of Notices to Airmen (NOTAM's), Pilot Reports (PIREP's), and Significant Meteorological Events (SIGMET's). However, these activities are not directly related to the level of user demand, and the resources required to perform these functions are not included in the flight service station workload measure.

Forecasts for individual Flight Service Stations are available upon request from the Forecast Branch, Office of Aviation Policy and Plans (APO-110).



CHAPTER VIII

TERMINAL AREA FORECASTS LARGE HUBS

This chapter discusses: (1) the top 50 airports in the United States ranked by total enplanements in fiscal year 1987; (2) the top 50 airports ranked by total operations in 1987; (3) forecasts of total enplanements and total operations at 30 large hub airports; (4) summary data for large, medium, and small hub airports; and (5) selected data by user category for three airports where "hub studies" were conducted for the metropolitan areas in 1988. For analytical purposes, airport hub size is consistent with the enplanement percentages indicated in the definition for air traffic hubs on page 217 of the Glossary of Terms.

The preliminary forecasts in this chapter are currently undergoing regional review. The final forecasts will be available in FAA Terminal Area Forecasts FY 1989-2000 (TAF) from the FAA Office of Aviation Policy and Plans.

REVIEW OF 1987

TOP 50 AIRPORTS

In fiscal year 1987, Chicago O'Hare and Atlanta were the busiest airports in the United States when ranked by total enplanements (air carrier, commuter, and air taxi) and total aircraft operations. Chicago had 27.5 million passenger enplanements and 796,600 aircraft operations. Atlanta had 23.9 million enplanements and 801,800 operations. Thus, Chicago and Atlanta ranked first and second, respectively, in total enplanements; but these rankings were reversed when total operations were considered. Other airports among the top five ranked by total enplanements in 1987 were Los Angeles International, Dallas/Fort Worth International, and Denver. These were ranked third, fourth, and fifth in total enplanements and third, fourth, and sixth, respectively, in total operations.

TOP 50 AIRPORTS
BY TOTAL ENPLANEMENTS IN 1987

(IN THOUSANDS)

Airport	Total Enplanements*	Percent**	Cumulative Percent	FY-86 Rank
1. Chicago O'Hare	27,532	5.89	5.89	1
2. Atlanta	23,871	5.11	11.00	2
3. Los Angeles Int'l	21,229	4.54	15.54	3
4. Dallas/Ft. Worth	20,751	4.44	19.98	4
5. Denver	16,133	3.45	23.43	5
6. New York Kennedy	14,390	3.08	26.51	8
7. San Francisco Int'l	13,996	3.00	29.51	7
8. Newark	12,194	2.61	32.12	6
9. New York LaGuardia	11,605	2.48	34.60	9
10. Miami	11,601	2.48	37.08	11
11. Boston	11,543	2.47	39.55	10
12. St. Louis Int'l	10,292	2.20	41.76	12
13. Detroit	9,883	2.11	43.87	14
14. Honolulu	9,412	2.01	45.89	13
15. Minneapolis/St. Paul	9,016	1.93	47.81	15
16. Phoenix	8,733	1.87	49.68	17
17. Pittsburgh	8,502	1.82	51.50	16
18. Washington National	7,417	1.59	53.09	19
19. Philadelphia	7,395	1.58	54.67	21
20. Houston Intercont'l	7,366	1.58	56.25	18
21. Las Vegas	7,330	1.57	57.82	24
22. Orlando	7,272	1.56	59.37	22
23. Seattle-Tacoma	7,156	1.53	60.90	20
24. Charlotte	6,230	1.33	62.24	23
25. Memphis	5,393	1.15	63.39	29
26. Washington Dulles Int'l	5,065	1.08	64.48	30
27. San Diego	4,989	1.07	65.54	27
28. Salt Lake City	4,867	1.04	66.58	26
29. Tampa	4,725	1.01	67.60	25
30. Kansas City	4,610	.99	68.58	31

(Continued on next page)

TOP 50 AIRPORTS
BY TOTAL ENPLANEMENTS IN 1987

(IN THOUSANDS)

Airport	Total Enplanements*	Percent**	Cumulative Percent	FY-86 Rank
31. Baltimore	4,553	.97	69.56	28
32. Ft. Lauderdale	4,113	.88	70.44	32
33. Houston Hobby	3,990	.85	71.29	33
34. San Juan	3,472	.74	72.03	38
35. New Orleans	3,455	.74	72.77	35
36. Cincinnati	3,333	.71	73.49	40
37. Cleveland	3,257	.70	74.18	34
38. Nashville	3,119	.67	74.85	49
39. San Jose	2,836	.61	75.46	37
40. Portland	2,811	.60	76.06	39
41. San Antonio	2,513	.54	76.60	41
42. Dallas Love Field	2,491	.53	77.13	36
43. Chicago Midway	2,435	.52	77.65	58
44. Indianapolis	2,387	.51	78.16	45
45. Hartford	2,365	.51	78.67	47
46. Dayton	2,336	.50	79.17	44
47. Kahului	2,331	.50	79.67	42
48. Albuquerque	2,256	.48	80.15	43
49. West Palm Beach	2,243	.48	80.63	48
50. Ontario	2,239	.48	81.11	46

Source: FAA TERMINAL AREA FORECASTS FY 1989-2000.

* Includes U.S. certificated route air carriers, foreign flag carriers, supplementals, air commuter, and air taxis.

** Based on 467.311 million passenger enplanements.

TOP 50 AIRPORTS
BY AIRCRAFT OPERATIONS IN 1987
(IN THOUSANDS)

Airport	Total Operations	Percent*	Cumulative Percent	FY-86 Rank
1. Atlanta	801.8	1.31	1.31	2
2. Chicago O'Hare	796.6	1.31	2.62	1
3. Los Angeles Int'l	655.2	1.07	3.69	4
4. Dallas/Ft. Worth	609.3	1.00	4.69	3
5. Orange C'ty/John Wayne	526.8	.86	5.55	5
6. Denver Stapleton	521.6	.86	6.41	6
7. Van Nuys	492.9	.81	7.22	7
8. San Francisco Int'l	451.1	.74	7.96	9
9. Long Beach	438.5	.72	8.68	16
10. Boston	435.9	.71	9.39	10
11. Phoenix Sky Harbor	435.8	.71	10.11	12
12. St. Louis Int'l	426.8	.70	10.81	8
13. Philadelphia	412.1	.68	11.48	19
14. Detroit Metro	411.6	.68	12.16	13
15. Oakland	397.7	.65	12.81	18
16. Honolulu	389.0	.64	13.45	23
17. Las Vegas	389.0	.64	14.09	26
18. Pontiac	386.3	.63	14.72	22
19. Memphis	384.0	.63	15.35	17
20. Minneapolis/St. Paul	383.4	.63	15.98	14
21. Newark	383.4	.63	16.61	11
22. Seattle Boeing Field	377.4	.62	17.22	15
23. Pittsburgh	371.2	.61	17.83	20
24. New York LaGuardia	366.0	.60	18.43	21
25. Miami Int'l	363.7	.60	19.03	28
26. Charlotte	363.4	.60	19.63	25
27. San Jose	358.0	.59	20.21	27
28. Denver/Centennial	348.0	.57	20.78	24
29. Washington National	324.4	.53	21.32	30
30. New York Kennedy	311.5	.51	21.83	29

(Continued on next page)

TOP 50 AIRPORTS BY AIRCRAFT OPERATIONS IN 1987

(IN THOUSANDS)

Airport	Total Operations	Percent*	Cumulative Percent	FY-86 Rank
31. Ft. Worth Meacham	304.0	.50	22.33	35
32. Houston Intercont'l	303.3	.50	22.82	34
33. Miami Tamiami	296.5	.49	23.31	31
34. Washington Dulles Int'l	295.9	.49	23.79	38
35. Salt Lake City	292.1	.48	24.27	39
36. Baltimore	291.1	.48	24.75	36
37. Seattle Tacoma Int'l	281.4	.46	25.21	44
38. Anchorage Merrill	280.5	.46	25.67	32
39. Houston Hobby	279.3	.46	26.13	37
40. Hayward	273.8	.45	26.58	42
41. Nashville Metro	267.5	.44	27.02	50
42. Melbourne	265.5	.44	27.45	65
43. Chicago Midway	256.9	.42	27.87	63
44. Orlando Int'l	251.6	.41	28.29	64
45. New Orleans Lakefront	251.1	.41	28.70	33
46. Tampa	246.8	.40	29.10	41
47. Tucson	243.9	.40	29.50	51
48. Deer Valley	243.9	.40	29.90	48
49. Burbank	243.3	.40	30.30	53
50. Portland Int'l	240.9	.40	30.70	62

Source: FAA TERMINAL AREA FORECASTS FY 1989-2000.

* Based on 60.977 million operations at 400 FAA-operated airport traffic control towers in FY 1987.

International travel through John F. Kennedy International Airport has recovered considerably from the decrease observed in previous years that has been attributed to fear of hijacking, hostage-taking, and other forms of terrorism. Consequently, Kennedy rose from eighth in total enplanements in 1986 to sixth in 1987. Prior to 1985, Van Nuys was the only general aviation airport that ranked among the top five in total operations. In 1986 and 1987 Van Nuys was ranked seventh; it was surpassed in total operations by both Orange County/John Wayne (previously, Santa Ana) and Denver.

In fiscal year 1987, the top 50 commercial airports accounted for 81.1 percent of the total number of enplanements (air carrier, commuter, and air taxi) which occurred at airports with 1,000 or more enplanements. In fact, the top five airports (Chicago, Atlanta, Los Angeles, Dallas/Fort Worth, and Denver) accounted for 23.4 percent of total passenger enplanements. The top 20 airports had 56.3 percent of total enplanements. These percentages are slightly lower than those reached in 1986.

LARGE/MEDIUM/SMALL HUB AIRPORTS

In fiscal year 1987, there were 30 large hub airports, 41 medium hub airports, and 64 small hub airports. The large hub airports accounted for 320.5 million enplanements, 68.6 percent of the approximately 467.3 million air carrier/commuter/air taxi passengers enplaned nationally. The medium hub airports enplaned 92.3 million passengers and the small hubs enplaned 34.8 million, 20.5 percent and 7.3 percent of the total, respectively. In terms of total passengers, the large hub airports grew by 7.4 percent in 1987. The medium and small hub airports grew by 11.4 percent and 9.7 percent, respectively.

Aircraft operations at the large hub airports totaled 12.1 million in 1987, about 3.0 percent above the 1986 level. At the medium and small hub airports, there were 8.9 million and 8.8 million operations, respectively. The 1987 operations at medium and small hub airports were 3.4 percent and 4.4 percent higher than the 1986 levels, respectively.

LARGE HUB AIRPORT FORECASTS

Using fiscal year 1987 as the base year, forecasts for airports in the TAF were generated for each year to 2000. The total enplanements and related operations forecasts for the 30 large hub airports for fiscal years 1995 and 2000 are presented on pages 151 and 153. By 2000, Chicago O'Hare is expected to reach nearly 42.0 million enplanements and Atlanta is expected to reach 31.3 million. It is anticipated that both Dallas/Fort Worth and Denver will have surpassed Atlanta in terms of total enplaned passengers by the year 2000.

TOTAL PASSENGER ENPLANEMENTS AT LARGE HUB AIRPORTS*

(IN THOUSANDS)

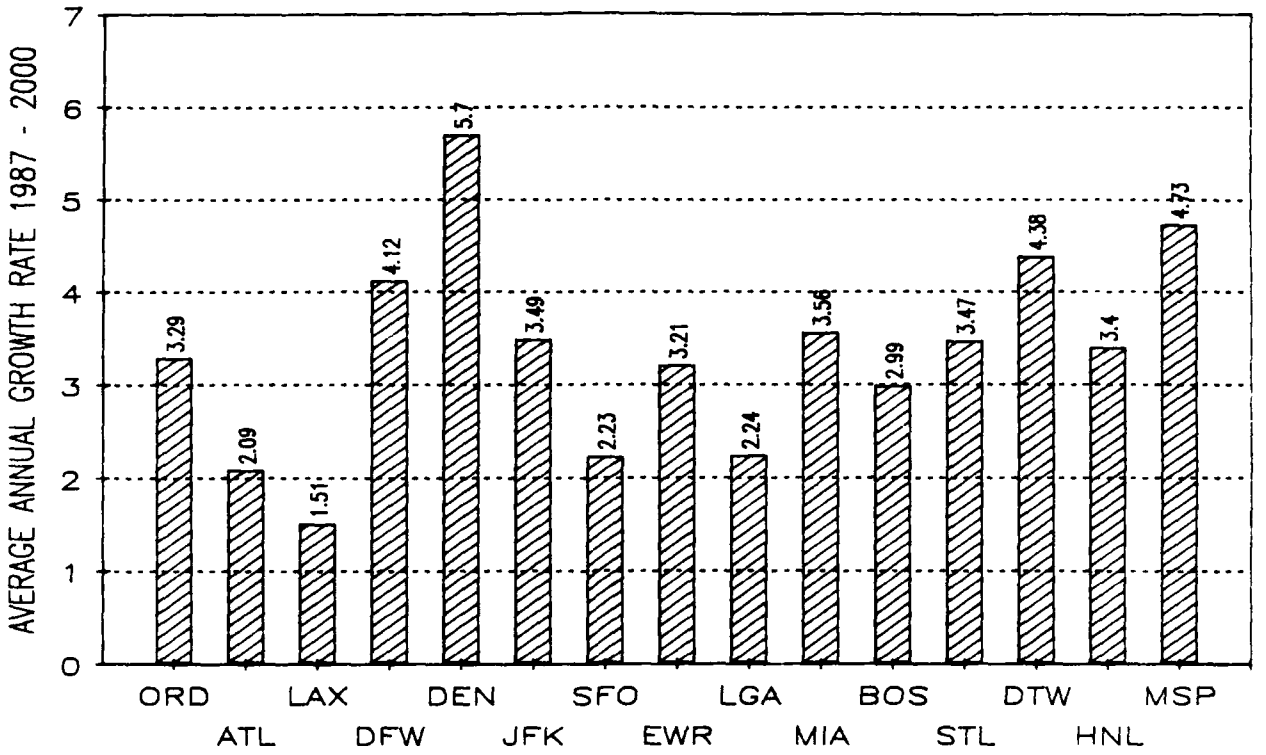
Airport	FY 1987	FY 1995	FY 2000
Chicago O'Hare	27,532	37,490	41,963
Atlanta	23,871	27,883	31,269
Los Angeles	21,229	24,296	25,795
Dallas/Ft. Worth	20,751	29,315	35,072
Denver	16,133	27,420	33,197
New York Kennedy	14,390	19,626	22,490
San Francisco	13,996	17,317	18,655
Newark	12,194	14,771	18,395
New York LaGuardia	11,605	14,126	15,484
Miami	11,601	15,906	18,293
Boston	11,543	14,489	16,945
St. Louis**	10,292	13,539	16,038
Detroit	9,883	14,497	17,263
Honolulu	9,412	12,794	14,547
Minneapolis/St. Paul**	9,016	13,577	16,445
Phoenix	8,733	15,232	19,514
Pittsburgh	8,502	13,217	16,822
Washington National	7,417	8,835	9,041
Philadelphia	7,395	11,181	13,802
Houston Intercont'l**	7,366	11,425	13,878
Las Vegas	7,330	11,469	14,194
Orlando	7,272	12,834	14,903
Seattle-Tacoma	7,156	10,272	11,238
Charlotte	6,230	9,479	11,346
Memphis	5,393	7,769	9,438
Washington Dulles	5,065	7,868	9,501
San Diego	4,989	7,222	9,007
Salt Lake City	4,867	8,052	9,829
Tampa	4,725	6,903	8,632
Kansas City	4,610	6,916	8,358

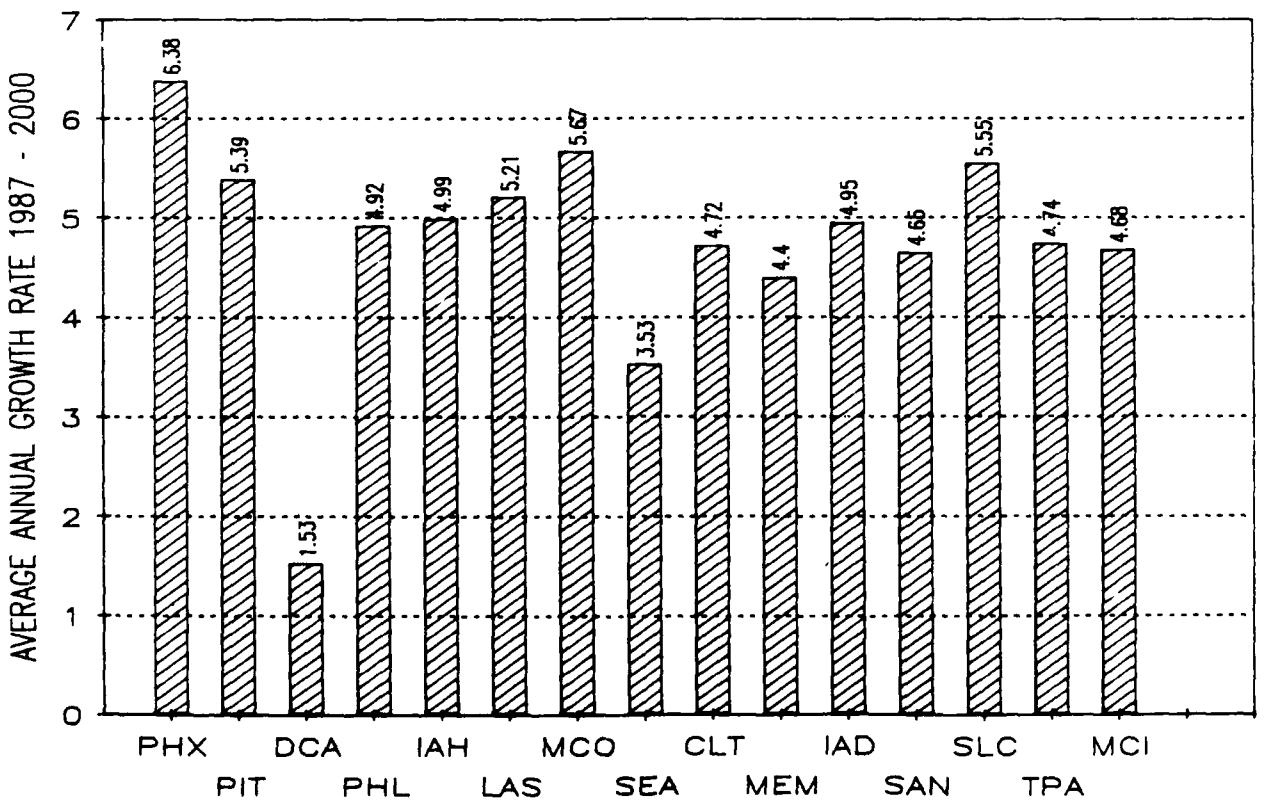
Source: FAA TERMINAL AREA FORECASTS FY 1989-2000.

* Includes U.S. certificated route air carriers, foreign flag carriers, supplementals, air commuters and air taxis.

** Forecasts as shown in individual hub forecast reports (or as adjusted).

PASSENGER ENPLANEMENTS AT LARGE HUB AIRPORTS





TOTAL AIRCRAFT OPERATIONS AT LARGE HUB AIRPORTS*

(IN THOUSANDS)

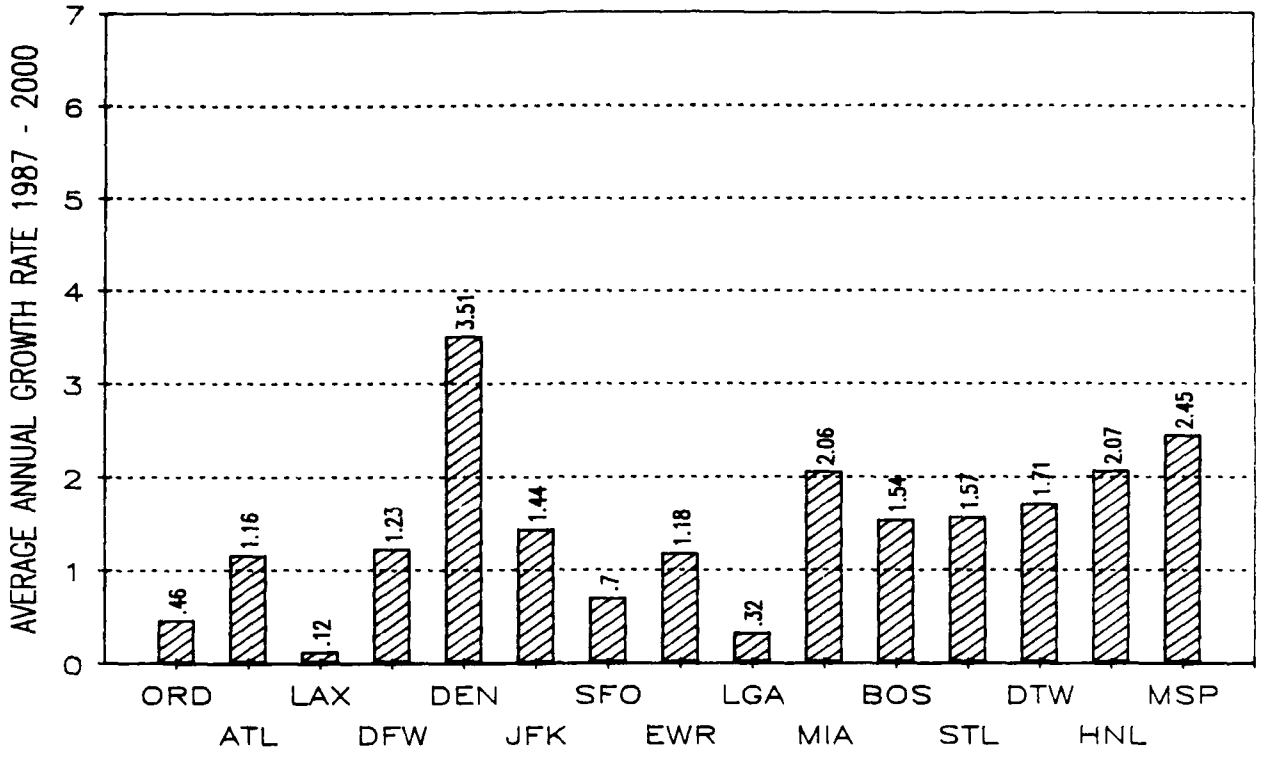
Airport	FY 1987	FY 1995	FY 2000
Chicago O'Hare	797	824	846
Atlanta	802	883	932
Los Angeles	655	657	666
Dallas/Ft. Worth	609	692	714
Denver	522	748	817
New York Kennedy	312	356	376
San Francisco	451	486	494
Newark	383	429	446
New York LaGuardia	366	382	382
Miami	364	418	475
Boston	436	497	532
St. Louis**	427	489	523
Detroit	412	485	514
Honolulu	389	448	508
Minneapolis/St. Paul**	383	467	525
Phoenix	436	550	598
Pittsburgh	371	452	486
Washington National	324	366	385
Philadelphia	412	481	508
Houston Intercont'l**	303	393	442
Las Vegas	389	485	525
Orlando	252	429	527
Seattle-Tacoma	281	356	378
Charlotte	363	496	540
Memphis	384	457	504
Washington Dulles	296	347	393
San Diego	193	241	265
Salt Lake City	292	414	475
Tampa	247	304	335
Kansas City	203	276	327

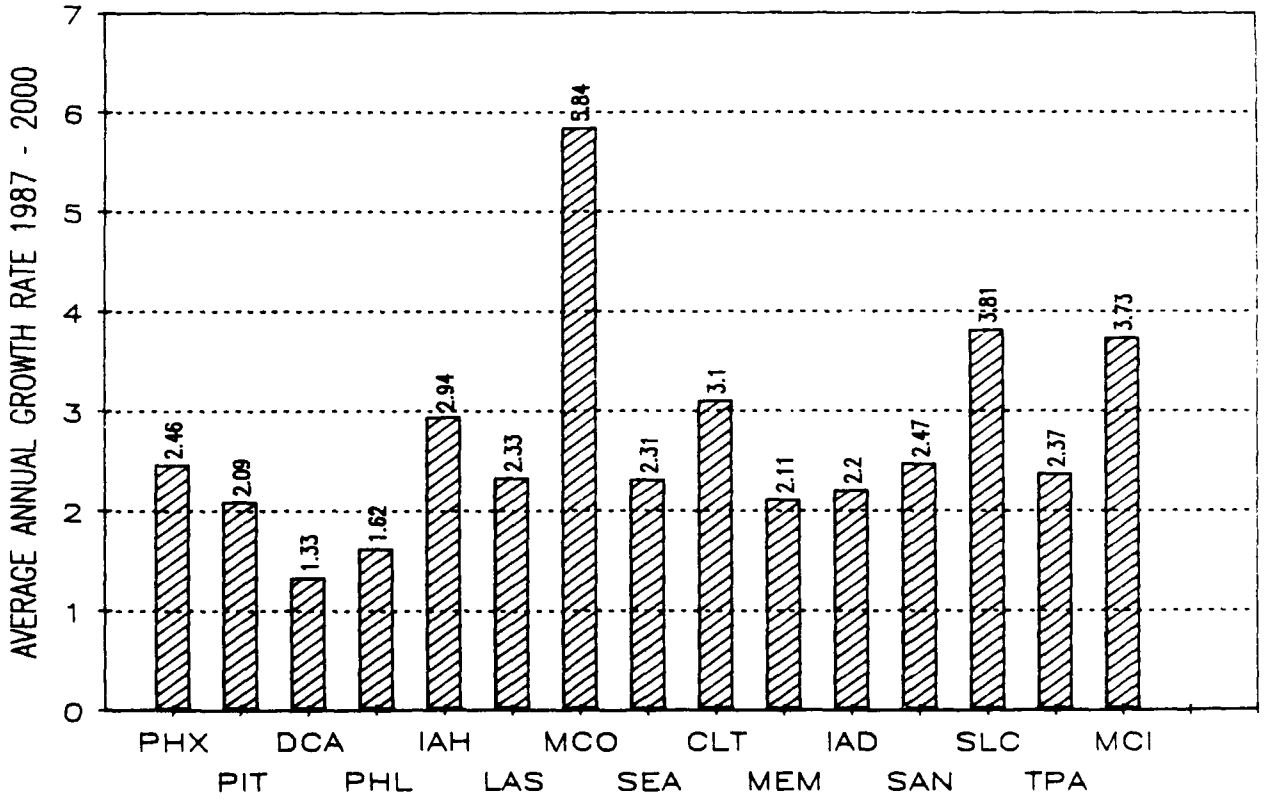
Source: FAA TERMINAL AREA FORECASTS FY 1989-2000.

* Includes total itinerant and local operations performed by commercial air carriers, air taxis, military, and general aviation.

** Forecasts as shown in individual hub forecast reports (or as adjusted).

TOTAL AIRCRAFT OPERATIONS AT LARGE HUB AIRPORTS





Total aircraft operations will reach 846,000 at Chicago O'Hare and 932,000 at Atlanta by the year 2000. These airports will continue to be the two busiest in the aviation system. Denver is expected to be the third busiest airport and Dallas/Fort Worth will be fourth. The increases in aviation activity at these and other airports will come from growth in the United States economy, as a whole, and local airport and airline developments. These developments may include the addition of new airline gates and the restructuring of airline fleets and, in the case of Denver, the construction of a new air carrier airport.

Some airports (such as Salt Lake City, Orlando, and Phoenix) will continue to have reasonably high enplanement growth resulting from general economic conditions and from managerial decisions by air carriers to use these airports as hubs. Other airports (Los Angeles, New York Kennedy, and Washington National, for example) are expected to experience relatively slow growth because of capacity, environmental, or policy constraints.

The average annual growth rates expected for the large hub airports for enplanements and operations for the 1987 to 2000 period are shown in the graphs on pages 152 and 154. Because of differences in the growth rates among airports, the relative ranks of these 30 hub airports in 2000 will differ from the rankings in 1987. For example, in the year 2000 Dallas/Fort Worth will rank second in total enplanements and Denver will rank third. These airports were ranked fourth and fifth, respectively, in 1987. The most significant increase in rank is exemplified by Phoenix which is expected to rise from 16th in 1987 to seventh place in 2000. At the other extreme, Washington National Airport is expected to fall from eighteenth place in 1987 to 27th in 2000 when ranked by total enplanements. Large shifts could occur also at other airports if a major airline decides to use a small or medium hub airport as a primary hub. Dulles International Airport has grown significantly following United Airlines' decision to use this airport as a hub. Nashville and Raleigh-Durham may experience similar shifts following American Airlines' decisions to use these airports as hubs. Airline mergers, consolidations and restructuring of routes may also affect the enplanements and operations forecasts and, consequently, the relative ranks of the major hub airports discussed in this section.

MEDIUM/SMALL HUB AIRPORT FORECASTS

The growth of enplanements and operations at the 41 medium and 64 small hub airports (relative to growth at the large hub airports) are compared in the following tables. The first table shows that passenger enplanements at the medium hub airports are expected to increase somewhat faster than at the large hub airports. Enplanements are forecast to grow at an annual average rate of 5.7 percent during the 1987-1995 period and at 4.4 percent between 1995 and 2000. Passenger enplanements at the small hub airports are expected to increase at a slower rate than the medium hubs during the forecast period. The expected increases are 4.4 percent per year between 1987 and 1995 and 3.9 percent between 1995 and 2000.

SUMMARY OF PASSENGER ENPLANEMENTS AT HUB AIRPORTS
(Millions)

	1987	1995	2000	AVERAGE ANNUAL PERCENT CHANGE 1987-1995	1995-2000
Large Hubs	320.5	445.7	521.4	4.2%	3.2%
Medium Hubs	92.3	144.1	178.6	5.7	4.4
Small Hubs	34.8	49.3	59.7	4.4	3.9

As indicated in the next table, aircraft operations at both the medium and small hub airports are expected to grow faster than the large hubs during the 13-year period. Between 1987 and 1995, operations are expected to grow at 3.3 percent at the medium hubs and 2.9 percent at the small hubs. During the 1995-2000 period, the growth rates are expected to be 1.6 percent and 2.9 percent respectively.

SUMMARY OF AIRCRAFT OPERATIONS AT HUB AIRPORTS
(Millions)

	1987	1995	2000	AVERAGE ANNUAL PERCENT CHANGE 1987-1995	1995-2000
Large Hubs	12.1	14.3	15.4	2.1%	1.5%
Medium Hubs	8.9	11.5	13.1	3.3	1.6
Small Hubs	8.8	11.1	12.8	2.9	2.9

SPECIAL HUB FORECASTS

Continuing the individual hub forecasting efforts begun in 1978, FAA sponsored three studies in 1987--Houston, Minneapolis/St. Paul, and St. Louis. These studies were conducted in conjunction with FAA regional, state and local planners, chambers of commerce, universities, and other interested parties.

These groups provide local aviation data, discuss general economic conditions (current, historical, and future outlook), sponsor and attend local seminars, and review preliminary reports. This procedure keeps the public informed of aviation activity in the local community, encourages local input and public participation in the planning process, and, consequently, enhances the final product.

The hub forecast studies examine the metropolitan statistical area or standard consolidated statistical area, as a whole. The area usually contains a major air carrier airport and several general aviation airports. Major objectives of these studies include: (1) examination of the interplay between the growth of aviation activity at the major airport and other airports in the area; (2) assessment of possible impacts of the growth of aviation activity in the area; and (3) examination of possible plans to accommodate the growth in aviation. Such plans may include reviews of possible distribution or redistribution of commercial and general aviation traffic and the development of reliever or satellite airports.

The graphics on the following pages depict the relative size and growth of enplanements and operations, by user category, at the major airports with commercial service in the large hubs discussed. Copies of the detailed studies are available from the Forecast Branch, Office of Aviation Policy and Plans.

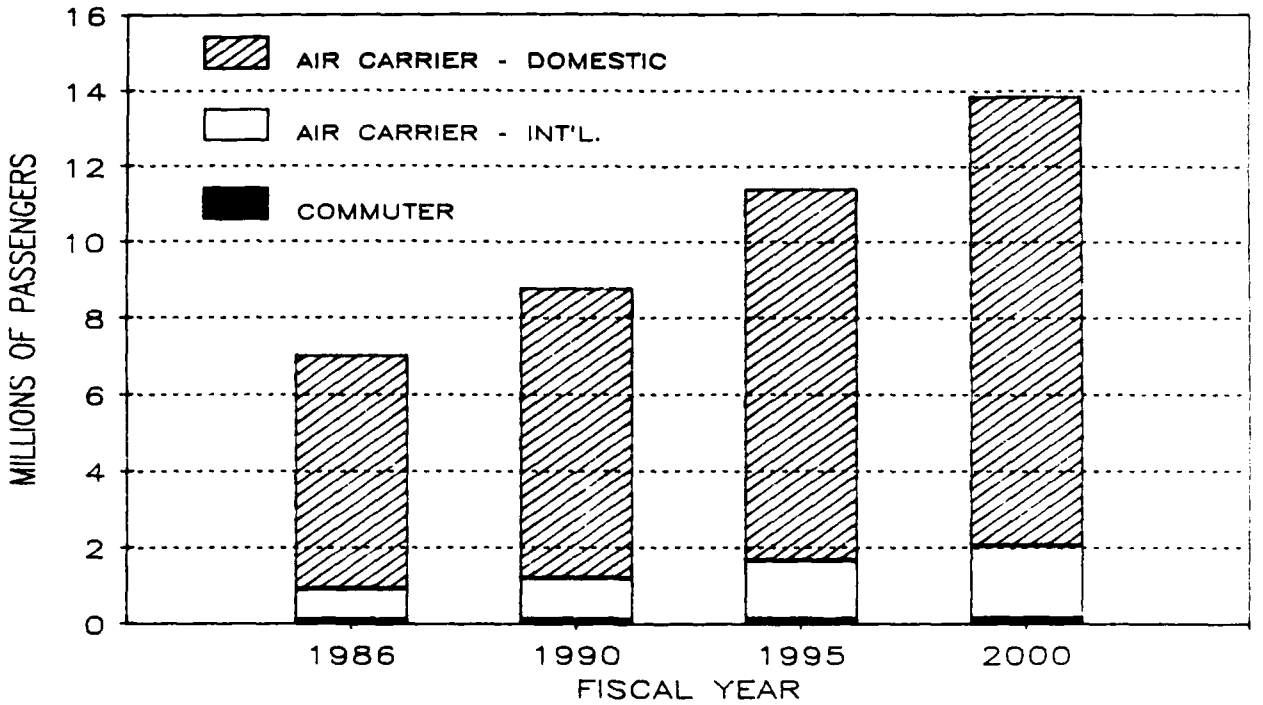
HOUSTON HUB

The Houston Hub is located in the Gulf Coast Prairies in Southeastern Texas. The southern boundaries of the hub are contiguous to the Gulf of Mexico. The Houston Hub presently comprises 7,422 square miles in a seven-county area. The economy of the Houston area is closely linked to petroleum exploration, production, and refining. The hub is also associated with the manned exploration of space. It is the home of the Johnson Space Center which serves as the command post for such missions. The population of the Houston Hub is forecast to be approximately 4.3 million by the year 2000, an increase of 17 percent over the 1986 level.

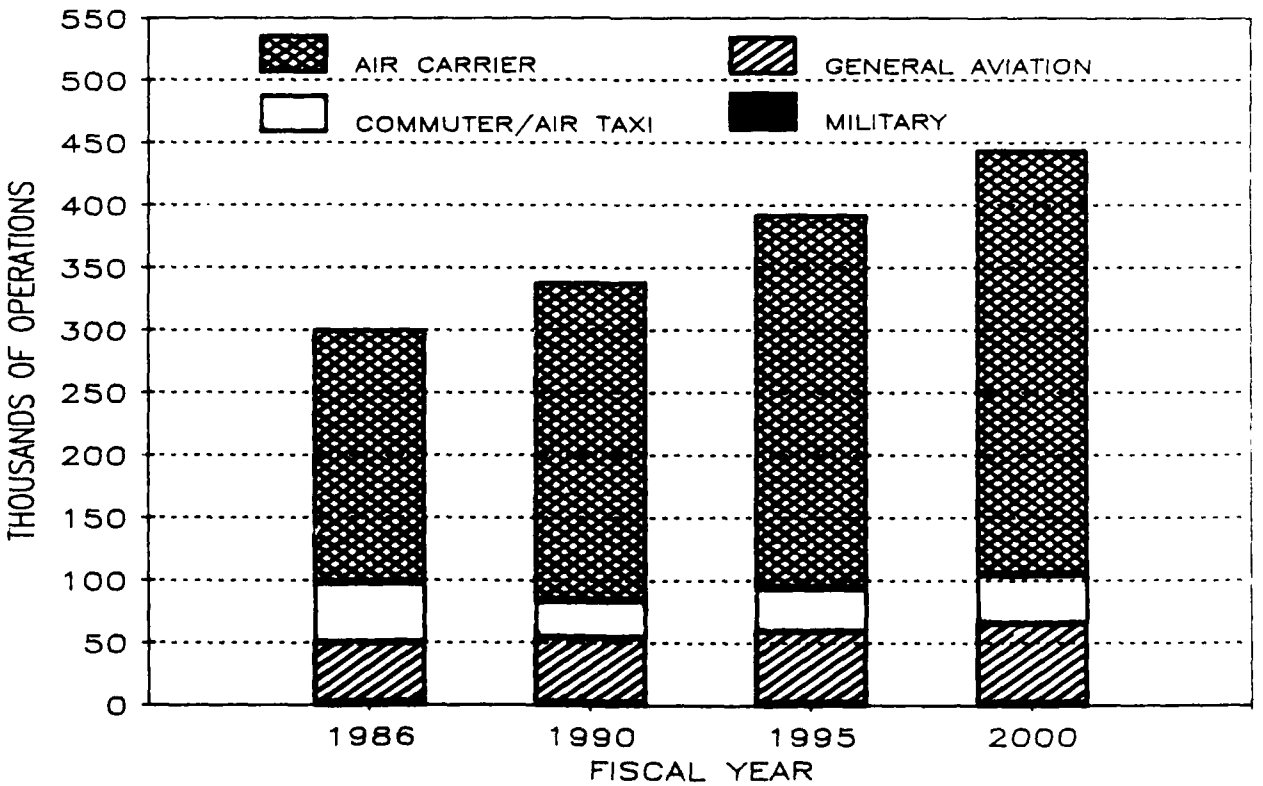
There are 32 public-use airports in the Houston Hub. Of these, three airports have FAA-operated air traffic control towers. There are two major air carrier airports serving the Hub--Houston Intercontinental Airport and Houston Hobby. These airports are located 16 miles and 9 miles, respectively, from Downtown Houston. These two airports together with the other public use airports provide takeoff and landing services to general aviation and military aircraft in the Houston area. The air carrier airports are served by 16 major domestic and international airlines.

HOUSTON INTERCONTINENTAL AIRPORT

PASSENGER ENPLANEMENTS



TOTAL AIRCRAFT OPERATIONS



Total passenger enplanements in the hub are projected to reach nearly 21.0 million a year by 2000. This number is 94 percent higher than the 10.8 million passengers recorded in 1986. Commercial aircraft operations in the Houston Hub are expected to reach 661,600 by the year 2000, about 55 percent more than the 427,700 operations handled in 1986. Houston Intercontinental Airport handled 58.4 percent of the commercial aircraft operations in the Hub in 1986; Hobby handled 29.3 percent.

By the year 2000, Houston Intercontinental Airport's share of commercial operations is expected to decrease slightly to 56.8 percent; Hobby's share will increase to 31.9 percent. The remainder of the commercial aircraft operations (primarily air taxi services) is distributed among the other public use airports. Itinerant general aviation aircraft operations in the Houston Hub are forecast to increase by an annual average of 2.4 percent during the 1986-2000 period. Local general aviation operations are expected to grow by 2.7 percent annually.

MINNEAPOLIS/ST. PAUL HUB

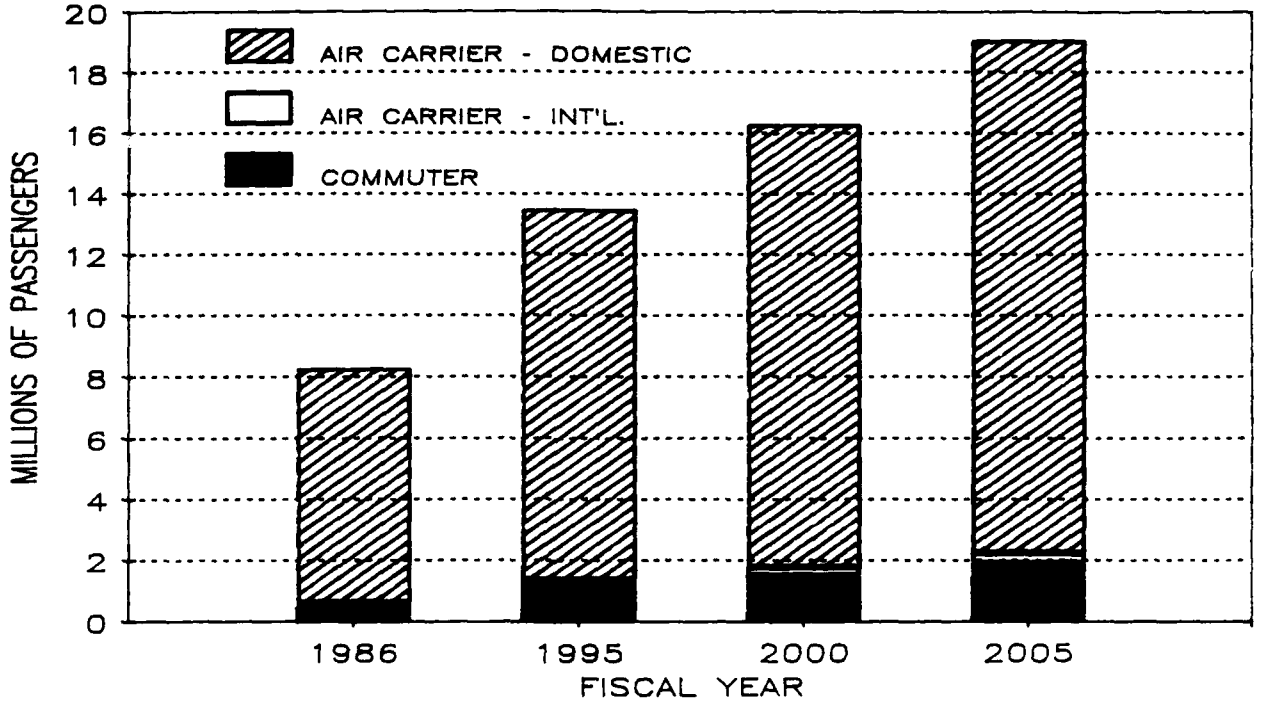
The Minneapolis/St. Paul Hub or the Minneapolis/St. Paul Metropolitan Statistical Area (MSA) is located in the eastern section of Minnesota. The MSA is an 11-county area that covers over 5,260 square miles. The MSA had a population of 2.3 million in 1986. By the year 2005, the population is estimated to reach approximately 2.7 million. The Minneapolis/St. Paul Hub is one of the largest business and commercial centers between Chicago and the West Coast. The hub serves as the headquarters for four of the world's largest wheat flour milling companies.

There are 17 public use airports in the Minneapolis/St. Paul MSA. Of these, four are FAA towered airports. International, domestic, and commuter air carrier services are provided at the Minneapolis/St. Paul International Airport which is located 10 miles southeast of Downtown Minneapolis. This airport as well as the area's 16 other public use airports provide takeoff and landing services to general aviation and military aircraft. Twelve scheduled air carriers and 23 all cargo carriers serve the Minneapolis/St. Paul International airport.

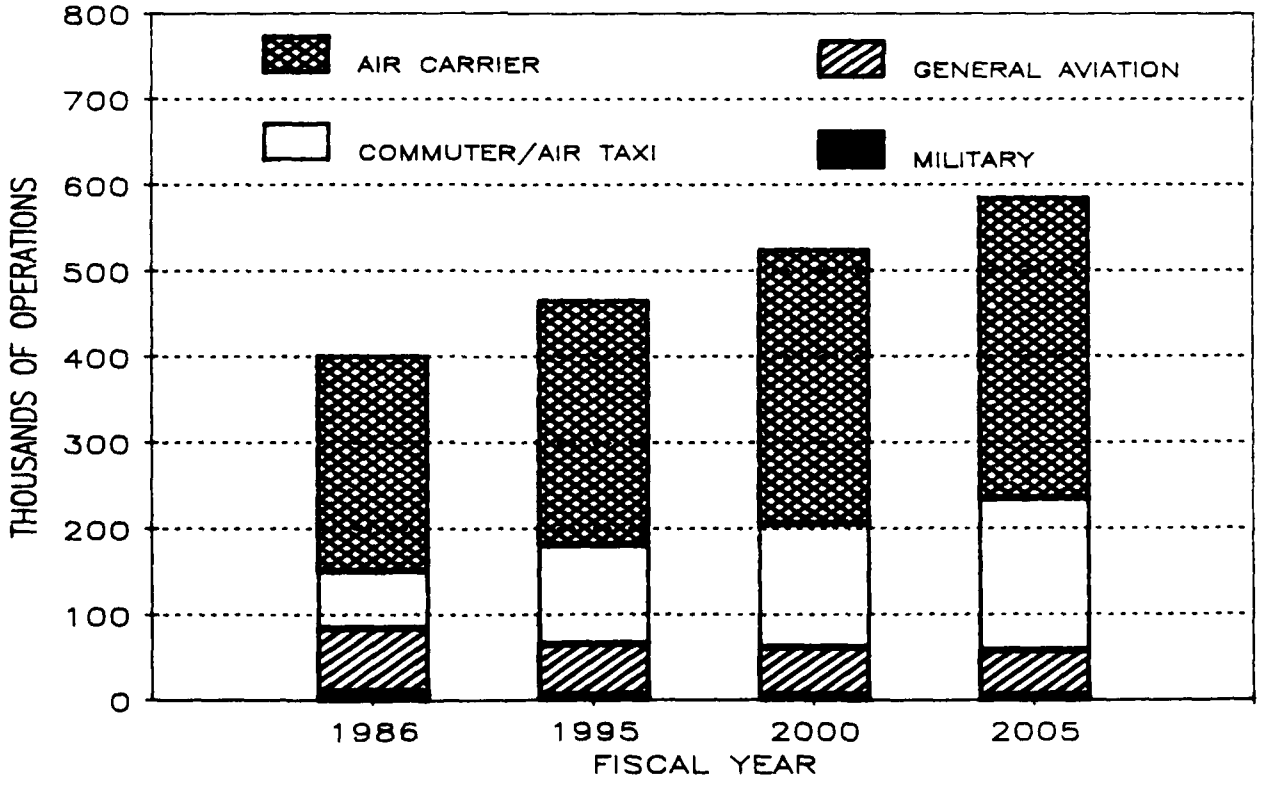
Total passenger enplanements in the hub are projected to reach 19.1 million in 2005. This represents an increase of 130 percent over the 8.3 million passengers enplaned in 1986. Commercial aircraft operations are forecast to reach 528,300 by 2005, representing a 66 percent increase over the 317,300 commercial aircraft operations that occurred in 1986. During the period 1986 through 2005, general aviation itinerant operations at the 17 airports in the Minneapolis/St. Paul Hub are forecast to grow at an average annual rate of 2.3 percent. General aviation local operations are expected to grow at 2.1 percent annually.

MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS

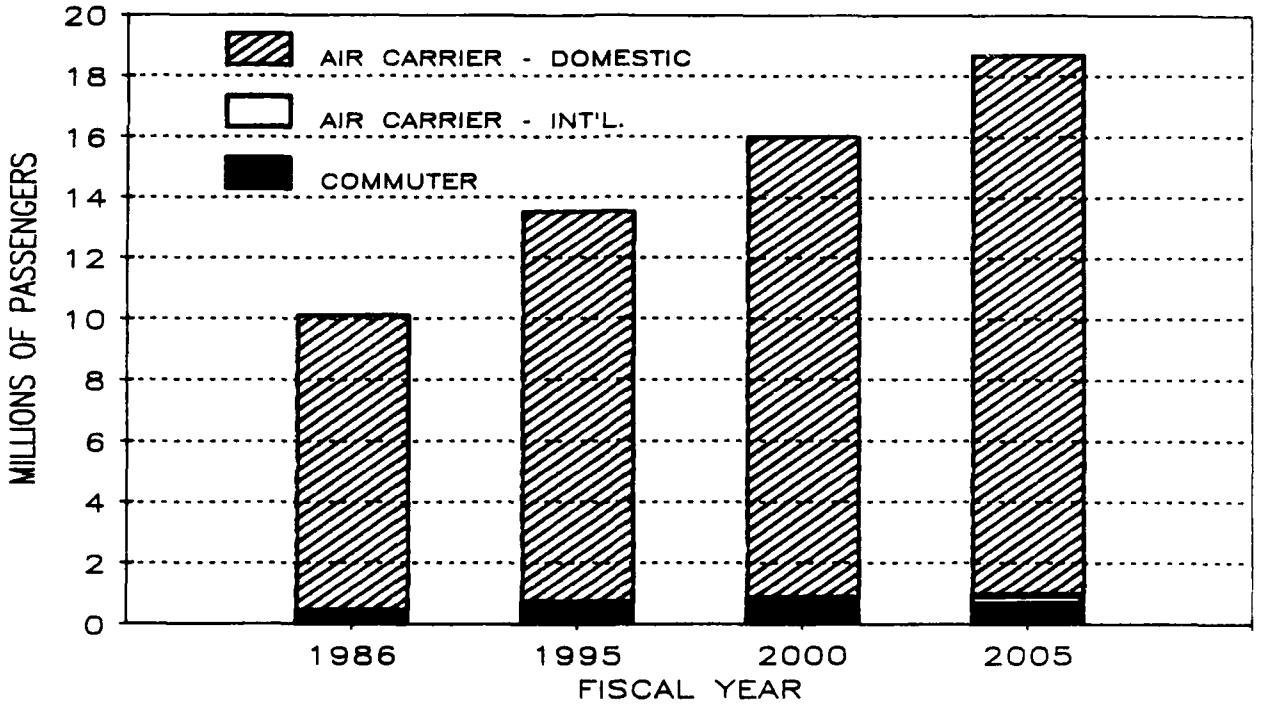


TOTAL AIRCRAFT OPERATIONS

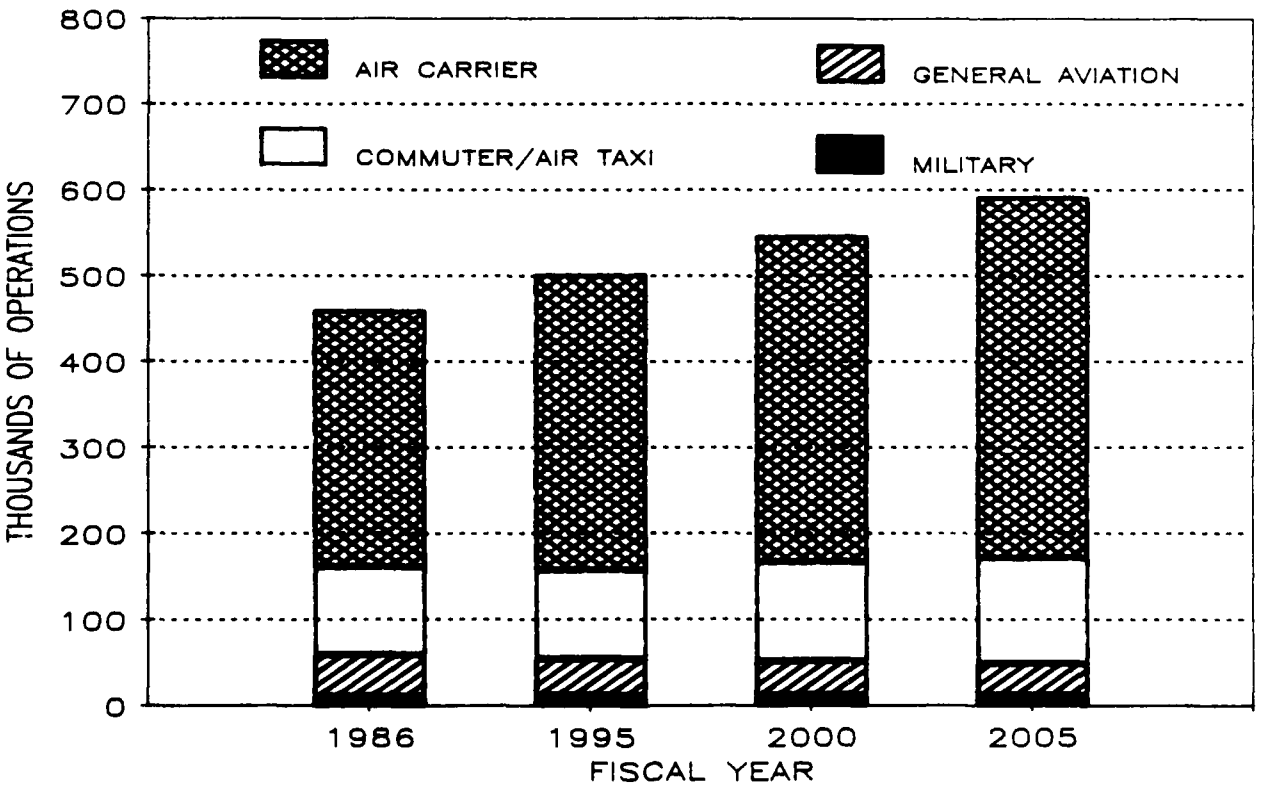


ST. LOUIS INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS



TOTAL AIRCRAFT OPERATIONS



ST. LOUIS HUB

The St. Louis Hub or the St. Louis MSA comprises nine counties and encompasses 5,341 square miles. Located on the banks of the Mississippi River, St. Louis served as a major fur trading center in its early days. Today, the City of St. Louis is a major manufacturing and transportation center and a major cultural and educational community. The population of the St. Louis MSA is expected to reach 2.5 million by the year 2005. This represents a small increase over the population level of 2.4 million estimated for 1986.

There are 17 public use airports in the St. Louis MSA. Of these, four airports have FAA air route traffic control towers. Five of the airports in the area are designated as reliever airports for the major air carrier airport. International and domestic air carrier services are provided at St. Louis International Airport. Ten scheduled carriers and 10 all-cargo carriers provide scheduled passenger and cargo service to the area. General aviation aircraft operations occur at Lambert St. Louis International Airport as well as at the other public use airports in the MSA.

Total passenger enplanements in the St. Louis Hub are expected to increase to 18.7 million by the year 2005. This represents an increase of 85 percent over the 1986 total of 10.1 million. Commercial aircraft operations are forecast at 543,200 for the year 2005. This represents a 33 percent increase over the 401,000 commercial aircraft operations reached in 1986. General aviation itinerant aircraft operations are expected to increase at an annual average rate of 2.8 percent during the 1986-2005 period. General aviation local aircraft operations are expected to increase by about 1.7 percent.

CHAPTER IX
FORECAST ACCURACY

The FAA provides 12-year forecasts of workload measures annually for manpower and facility planning. To provide some measure of the accuracy of these forecasts, the following two tables compare forecast data for 10 years with actual data for two key FAA workload measures: instrument operations and aircraft handled. The forecast error for fiscal year 1988, beginning with the forecast issued in fiscal year 1978 for aircraft handled, ranged from -3.0 percent to +18.2 percent, with the average absolute error for the 10 data points being 6.3 percent.

The forecast error in the short-term (1 to 5 years--the critical period for manpower planning) tends to be minimal. In fiscal year 1988, the error for aircraft handled for this 5-year period ranged from -3.0 to +2.2 percent, with the average absolute error for the five data points being 1.3 percent.

It should be noted that the FAA forecasts were significantly lowered beginning in fiscal year 1981. This was caused by two external events that had not been anticipated in previous forecasts--the more than doubling of fuel prices due to the OPEC actions taken in 1979-1980, and the failure of general aviation to respond to the economic recovery. Both of these events were recognized as having long-term impacts on the aviation system. The FAA has established a forecast process that attempts to anticipate external events that may impact the industry, but it should be recognized that there will always be unanticipated events that could alter our forecasts.

FAA INSTRUMENT OPERATIONS FORECAST EVALUATION
(Millions)

Forecast - Years Out

Year	Actual	1	2	3	4	5	6	7	8	9	10
1984	37.3	36.6	37.8	41.4	46.6	45.5	41.5	41.0	43.0	N.I.	N.I.
1985	38.7	39.1	39.4	40.9	43.1	48.1	47.3	43.1	41.8	44.5	N.I.
1986	40.5	40.6	40.9	40.8	42.6	44.8	49.4	49.2	45.1	43.7	46.2
1987	43.4	41.7	42.3	42.3	42.4	44.3	46.2	50.6	51.0	47.4	45.9
1988	44.3	45.4	43.0	43.8	43.6	44.2	46.0	47.7	51.5	53.2	49.9
1989		45.8	47.2	44.2	45.7	45.5	45.3	47.4	49.1	53.0	53.9
1990			47.7	49.1	45.4	47.3	47.2	46.6	48.7	50.8	54.2
1991				49.5	50.7	46.4	48.5	48.7	47.8	50.2	52.4
1992					51.3	51.8	47.5	49.5	50.2	49.1	51.5
1993						52.5	52.8	48.5	50.4	51.1	50.3
1994							53.8	54.0	49.6	51.3	52.0
1995								55.1	55.1	50.7	52.2
1996									56.3	56.2	51.7
1997										57.4	57.3
1998											58.5

PERCENT ERROR
(Forecast/Actual)

1984		(1.9)	1.3	11.0	24.9	22.0	11.3	9.9	15.3	N.I.	N.I.
1985		1.0	1.8	5.7	11.4	24.3	22.2	11.4	8.0	15.0	N.I.
1986		-	0.9	0.7	5.2	10.6	22.0	21.5	11.4	7.9	14.1
1987		(3.9)	(2.5)	(2.5)	(2.3)	2.1	6.5	16.6	17.5	9.2	5.8
1988		2.5	(2.9)	(1.1)	(1.6)	-	3.8	7.7	16.3	20.1	12.6

N.I. = Not Issued

FAA ARTCC AIRCRAFT HANDLED FORECAST EVALUATION

(Millions)

		Forecast - Years Out									
Year	Actual	1	2	3	4	5	6	7	8	9	10
1984	31.6	31.2	30.5	30.8	35.6	36.1	36.9	35.8	33.9	N.I.	N.I.
1985	32.7	32.8	32.1	31.6	32.4	37.2	37.3	38.4	37.2	35.0	N.I.
1986	34.2	34.0	33.9	33.1	32.8	33.6	38.4	38.7	39.7	38.2	36.3
1987	35.8	35.4	35.1	35.0	34.0	34.0	34.7	39.5	40.1	41.4	39.6
1988	36.2	37.0	36.6	36.1	36.1	35.1	35.2	36.1	40.5	41.1	42.8
1989		37.2	38.0	37.6	37.2	37.4	36.3	36.1	37.5	41.3	42.0
1990			38.2	39.2	38.7	38.4	38.2	37.4	37.1	38.9	42.2
1991				39.7	40.3	39.6	39.4	39.8	38.4	38.3	40.3
1992					40.8	41.4	40.6	40.5	41.1	39.6	39.3
1993						41.6	42.3	41.3	41.5	42.5	40.7
1994							42.5	43.3	42.3	42.6	43.6
1995								43.5	44.1	43.1	43.6
1996									44.4	45.1	44.0
1997										45.1	46.0
1998											46.1

PERCENT ERROR

(Forecast/Actual)

1984		(1.3)	(3.5)	(2.5)	12.7	14.2	16.8	13.3	7.3	N.I.	N.I.
1985		0.3	(1.8)	(3.4)	(0.9)	13.8	14.1	17.4	13.8	7.0	N.I.
1986		(0.6)	(0.9)	(3.2)	(4.1)	(1.7)	12.3	13.2	16.1	11.7	6.1
1987		(1.1)	(2.0)	(2.2)	(5.0)	(5.0)	(3.1)	10.3	12.0	15.6	10.6
1988		2.2	1.1	-	-	(3.0)	(2.8)	-	11.9	13.5	18.2

N.I. = Not Issued

THE FAA AVIATION FORECASTING PROCESS

INTRODUCTION

The Federal Aviation Administration's (FAA) forecasting process is a continuous and interactive one that involves the FAA Forecast Branch, other FAA Offices and Services, other Government agencies, and aviation industry groups. In addition, the process uses various economic and aviation data bases, econometric models and equations, and other analytical techniques.

Forecasting aviation activity is an essential component of the FAA's planning process. The forecasts are used to determine staffing levels and capital expenditures that will be needed to accommodate growth of activity in a safe and efficient environment. The forecasts are also used for short-term budget preparation, cost-benefit analyses, and safety analyses. The relative importance of the forecasting function in the planning process can be gauged by examining the major changes being made to the National Airspace System during the next 10 years. These changes are being made, in part, to accommodate the projected growth in air traffic.

In rebuilding the air traffic control and air navigation systems, the FAA is installing new aircraft landing systems, developing new radar and communication systems, and upgrading weather services to aircraft operators. The estimated cost of this modernization program is approximately $12.2 billion. Because of the sizeable investments being made in the National Airspace System, it is essential that the FAA develop and utilize the most accurate and reliable forecasts possible. Consistently large forecast errors will lead to inefficient allocation of scarce resources. Thus, review and evaluation of the FAA forecasting procedures, models, forecast assumptions, and forecast results constitute an essential part of the process.

SYSTEM BACKGROUND

As part of the need for ensuring safe and efficient operation of the National Airspace System, FAA operates 399 airports with air traffic control towers, 22 air route traffic control centers, and, as of late fiscal year 1988, 220 flight service stations. Many of the nonautomated flight service stations will be absorbed into 61 new automated facilities by 1992. Thus, the FAA facilities perform a large and diverse number of services for the aviation community.

The FAA towers provide sequencing and separation services to pilots and aircraft arriving at or departing from individual airport facilities. These services are provided to various categories of aircraft: air carriers, commuters, air taxis, general aviation, and military. The arrivals and departures (landings and takeoffs) are generally referred to as aircraft operations.

The arrivals and departures are further classified as itinerant or local operations depending on the purpose of the flight or the distance between the airports from which the landings and takeoffs were made. These operations are measures of workload or activity at individual airports. The sum of these operations at all towered airports constitute the national counts of aircraft operations.

Another important workload measure at FAA tower airports is the number of instrument operations. This is essentially an aircraft operation performed in accordance with an instrument flight rule (IFR) flight plan or an aircraft flight where IFR separation between aircraft is provided by the facility. Instrument operations are further subdivided into (1) primary instrument operations (separation and sequencing services provided to aircraft landing at the airport providing the service), (2) secondary instrument operations (services provided to aircraft landing at a nearby airport), and (3) overs (services provided to aircraft which are transiting the facility's controlled airspace without landing in the area).

Each air route traffic control center (ARTCC) controls aircraft which are flying under instrument flight rules in the center's designated geographic control area. At times, advisory services may be offered to aircraft flying under visual flight rules (VFR). The workload measures for the centers are the numbers of IFR aircraft. The IFR counts are categorized by user groups.

Flight service stations provide a variety of services to the aviation community. They collect and disseminate meteorological and weather information, provide briefings to pilots, and provide assistance in emergencies to lost, disoriented, or downed airmen. The workload measures at flight service stations are weighted sums of the number of flight plans filed, pilot briefings provided, and aircraft contacted.

This document, "FAA Aviation Forecasts, Fiscal Years 1989-2000, March 1989," contains 133 distinct time-series variables. (The number does not include derived subtotals and totals.) Of these, four economic independent variables are obtained from sources external to the FAA. The FAA analysts or forecasters have no control over these truly exogenous variables. There are 12 quantifiable air carrier forecast assumptions and four quantifiable commuter carrier forecast assumptions. Within justifiable limits, these forecast assumptions are under the control of the analysts. There are 83 aviation variables that, strictly speaking, are not FAA workload measures; but these influence the true workload measures in one way or another. Finally, there are 30 aviation variables which are the workload measures used by the FAA for policy and planning considerations and for manpower and investment planning.

The table at the end of this chapter contains a list of the variables and the sources for the historical data and their relationship to different aspects of the forecast process. Forecasts of the economic variables and the military fleet and hours flown are developed outside the FAA. All other forecasts are developed by the FAA. From the preceding discussion, it follows that the FAA must explicitly consider at least 133 variables when producing a set of national forecasts.

Research undertaken in the early and mid 1970's indicated that some measures of economic activity (such as gross national product or total employment) and some measures of prices (for example, aircraft prices and aviation fuel prices) were useful predictors of aviation activity. Some unique events (including the enactment of the Airline Deregulation Act of 1978, the air traffic controllers' strike in August 1981, and the prolonged depressed state of the general aviation industry) have altered the relationships between the key aviation variables and the economic variables used previously. It has been difficult, therefore, to produce economic or econometric models which predict aviation activity with the same degree of reliability as the models which were developed in earlier periods. Thus, for the present, the forecasters must rely to a greater degree on subjective judgement and evaluation than was required previously.

THE FAA FORECASTING PROCESS

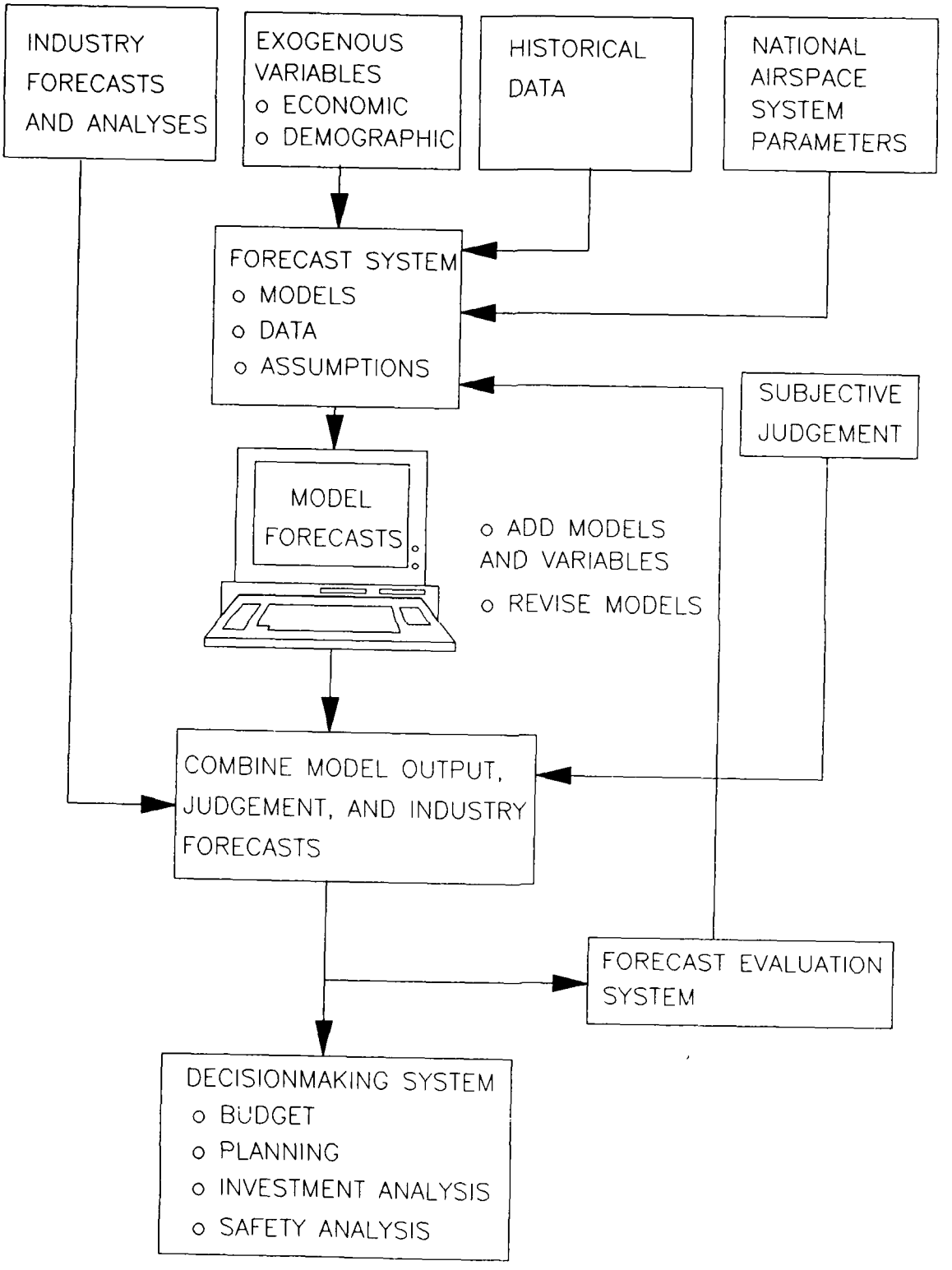
The FAA forecasting process is an interactive system that combines econometric and time series model results with aviation industry forecasts, expert opinions, and anticipated policy impacts to derive a set of FAA aviation forecasts that are used in the decisionmaking process. The following flow diagram shows a generalized version of the FAA aviation forecasting process.

The first step in developing the forecasts is to enter the economic and demographic variables into a set of econometric models or equations that represents a simplified version of the real world. The economic and demographic variables (the truly independent and exogenous variables) are developed outside the FAA and, therefore, are not within the analysts' control. It is evident that the degree of accuracy of the forecasts of aviation activities depends on both the accuracy of the forecasts of the independent variables and the ability of the models to portray activities in the real world.

The mechanical execution of forecast models is only the first step in producing a set of forecasts. In general, these models and equations are simple portrayals of a complex system. They cannot account for a number of political, social, psychological, and economic variables and all the interrelated actions and reactions that eventually lead to a particular set of results. Consequently, the initial model results are reviewed, revised, and adjusted to reflect the analysts' best judgment of the impacts of the events which are occurring or are expected to occur during the forecast period.

The FAA forecasting process is both continuous and iterative. As such, it is important to evaluate the forecast results and to determine the basis of the deviations of the forecast values from the actual values observed in the real world. The analysis of the errors generally identifies the causes of the deviations and helps in determining the proportion due to improper model specifications, erroneous forecasts of independent variables, erroneous forecast assumptions, or incorrect analysts' judgments and opinions. If warranted, the forecast error analysis may lead to a reformulation of the model and to additions or deletions of independent variables, revisions of forecast assumptions, and/or changes in analysts' opinions and judgments about future events.

FAA FORECASTING SYSTEM



FORECAST EVALUATION

It is essential that the FAA forecasts of the demand for services at the FAA towers, air route traffic control centers, and the flight service stations be accurate. Large forecast errors can lead to inefficient allocation of resources which, in turn, could lead to capacity constraints and delays or to excess capacity in the National Airspace System. For this reason, FAA must continuously evaluate the forecasting process and its results.

The evaluation of the forecast process proceeds on several fronts. On a monthly basis, FAA tracks its short-term forecasts of aircraft operations, instrument operations, aircraft handled, and flight services vis-a-vis the actual counts at the facilities. This tracking system alerts FAA management to unexpected deviations from the trends suggested by the forecasts. Inquiries are then initiated to determine the cause(s) of the deviations. As a result of this process, revised short-term forecasts may be generated, if necessary.

To help the analysts make correct decisions and informed judgments when developing the forecast assumptions, FAA holds a series of meetings with industry representatives to discuss industry trends, recent developments, and possible future courses of events. Every 2 years, for example, FAA, in cooperation with the National Academy of Sciences, Transportation Research Board (TRB), sponsors a "forecast assumptions workshop." This workshop is attended by 70 to 80 industry planners and forecasters representing the airlines, aircraft manufacturers, engine manufacturers, and other industry groups.

The participants in various subgroups identify specific assumptions about the short-term and long-term future trends of the economic and aviation variables that are important to their segments of the industry, indicate why these are considered important, and show why specific trends are anticipated. After discussing the assumptions, the entire group attempts to reach a consensus about the key variables affecting the industry and the most likely future courses of these variables. Finally, the TRB prepares and publishes a workshop report. The participants benefit from the discussions and the analysts have the TRB workshop report as a benchmark for preparing forecasts or for evaluating forecasts prepared by other organizations. FAA uses this forum and the workshop report in preparing and in evaluating its aviation forecasts.

Formal and informal meetings with individuals and representatives of specific industry groups represent other avenues used by the FAA to promote dialogue and discussion with the aviation community and to solicit input and comments. In the past, separate meetings were held with the aircraft manufacturers, as a group, and with members of the Air Transport Association (ATA). In addition, FAA analysts maintain one-on-one contact with industry representatives through approved field visits, telephone contacts, and correspondence to explore specific questions or problems.

Another intermediate step in the FAA aviation forecast process is the public dissemination of the forecast results, solicitation of industry comments, and critique of the forecasts. The main avenue used for this purpose is the "FAA Aviation Forecast Conference" held annually in February or March. The 400 to 500 participants at the conference generally include airline executives, aircraft and engine manufacturers, consumer groups and other industry representatives, and the news media. To the maximum extent possible, FAA responds to questions raised about the forecasts both during and after the conference.

An important part of the conference is the opportunity for various segments of the aviation community to make technical presentations on a variety of topics of interest to the aviation community. The FAA aviation forecast conference establishes avenues of communication through which FAA releases its forecasts to the aviation community and the public and receives comments, criticisms, and feedback about the forecasts. The FAA also receives valuable information and insights through the papers presented at the forecast conferences.

FAA also seeks to improve the forecast accuracy and credibility by inviting FAA regional and state participation in the forecast process. For example, facility level terminal area forecasts and flight service station forecasts are circulated to FAA regions for review and comments. The comments and suggested changes are incorporated in the final facility level reports. In the case of the terminal area forecasts, the FAA regions have the capability to make changes by computer. The final facility level forecasts derived by this procedure must be consistent with the national forecasts.

Periodically, FAA prepares a technical report that compares the accuracy of the forecasts of key workload measures with the accuracy of forecasts of economic variables prepared by major forecasting services. Based on the results of these studies, the FAA forecasts compare quite favorably with those produced by these major forecasting services. (For details, see APO Bulletin, "Accuracy of FAA Forecasts," APO-88-1, May 1988.)

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES

The following economic and aviation-specific variables and FAA workload measures are contained in the "FAA Aviation Forecasts, Fiscal Years 1989-2000, March 1989." The generic classification of the variables and the sources of the historical data are listed below. Forecasts of the economic variables and the military fleet and hours flown are developed outside the FAA. All other forecasts are developed by the FAA.

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
ECONOMIC:	
Gross national product (GNP)	OMB, DRI, Evans, WEFA
Consumer price index (CPI)	OMB, DRI, Evans, WEFA
Oil and gas deflator	OMB, DRI, Evans, WEFA
Fuel price index	OMB, DRI, Evans, WEFA
AIR CARRIER	
FORECAST ASSUMPTIONS	
Domestic Operations:	
Average seats per aircraft	RSPA
Average passenger trip length	RSPA
Revenue per passenger mile (current $)	RSPA
Revenue per passenger mile (1982-1984 $)	Computed
Average jet fuel prices (current $)	RSPA
Average jet fuel prices (1982-1984 $)	Computed
International Operations:	
(Same as Domestic)	(Same)
SCHEDULED PASSENGER TRAFFIC	
Domestic:	
Revenue passenger miles (RPM's)	RSPA
Revenue passenger enplanements	RSPA
Available seat miles	RSPA
Load factors	RSPA
International:	
Revenue passenger miles by Regions	RSPA
Revenue passenger enplanements by Regions	RSPA
Available seat miles	RSPA
Load factors	RSPA

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
FLEET:	
2-Engine narrowbody	FAA/AVN-120
3-Engine narrowbody	FAA/AVN-120
4-Engine narrowbody	FAA/AVN-120
2-Engine widebody	FAA/AVN-120
3-Engine widebody	FAA/AVN-120
4-Engine widebody	FAA/AVN-120
HOURS FLOWN BY EQUIPMENT	
Same Variables as Fleet	RSPA
FUEL CONSUMED	
Jet:	
Domestic air carriers	RSPA
International air carriers	RSPA
General aviation	FAA/APO-110
Aviation Gasoline:	
Air carriers	FAA/APO-110
General aviation	FAA/APO-110
REGIONALS/COMMUTER	
FORECAST ASSUMPTIONS:	
Average seats per aircraft	RSPA
Average passenger trip length (48 States)	RSPA
Average passenger trip length (Hawaii, Puerto Rico, Virgin Islands)	RSPA
Average load factor	RSPA
PASSENGER TRAFFIC:	
Revenue passenger enplanements (48 States)	RSPA
Revenue passenger enplanements (Hawaii, Puerto Rico, Virgin Islands)	RSPA
Revenue passenger miles (48 States)	RSPA
Revenue passenger miles (Hawaii, Puerto Rico, Virgin Islands)	RSPA
FLEET (Aircraft):	
Less than 15 seats	FAA/AVN-120
15 to 19 seats	FAA/AVN-120
20 to 40 seats	FAA/AVN-120
More than 40 seats	FAA/AVN-120

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
GENERAL AVIATION	
FLEET:	
Single engine piston aircraft	FAA/AMS-420
Multi-engine piston aircraft	FAA/AMS-420
Turboprop aircraft	FAA/AMS-420
Turbojet aircraft	FAA/AMS-420
Piston-powered rotorcraft	FAA/AMS-420
Turbine-powered rotorcraft	FAA/AMS-420
Other general aviation aircraft	FAA/AMS-420
NUMBER OF AIRCRAFT BY REGION:	
Total aircraft in each of nine FAA Regions	FAA/AMS-420
HOURS FLOWN:	
Hours flown by equipment type (See general aviation fleet)	FAA/AMS-420
FUEL CONSUMED:	
Fuel consumed by equipment type (See general aviation fleet)	FAA/APO-110
ACTIVE PILOTS:	
Students	FAA/AMS-420
Private pilots	FAA/AMS-420
Commercial	FAA/AMS-420
Airline transport	FAA/AMS-420
Helicopter	FAA/AMS-420
Glider	FAA/AMS-420
Other	FAA/AMS-420
Instrument rated	FAA/AMS-420
FAA WORKLOAD MEASURES	
FAA TOWERS:	
Number of FAA Towers	FAA/AMS-420
Aircraft Operations:	
Air carrier itinerant operations	FAA/AMS-420
Air taxi/commuter itinerant operations	FAA/AMS-420
General aviation itinerant operations	FAA/AMS-420
Military itinerant operations	FAA/AMS-420
General aviation local operations	FAA/AMS-420
Military local operations	FAA/AMS-420

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
Instrument Operations:	
Air carrier	FAA/AMS-420
Air taxi/commuter	FAA/AMS-420
General aviation	FAA/AMS-420
Military	FAA/AMS-420
NON-IFR Instrument Operations:	
Terminal control areas	FAA/AMS-420
Expanded radar service areas	FAA/AMS-420
AIR ROUTE TRAFFIC CONTROL CENTERS	
IFR Departures:	
Air carrier	FAA/AMS-420
Air taxi/commuter	FAA/AMS-420
General aviation	FAA/AMS-420
Military	FAA/AMS-420
IFR Overs:	
(Same as IFR departures	FAA/AMS-420
FLIGHT SERVICE STATIONS:	
IFR-DVFR flight plans originated	FAA/AMS-420
VFR flight plans originated	FAA/AMS-420
Pilot briefings	FAA/AMS-420
Air carrier aircraft contacted	FAA/AMS-420
Air taxi/commuter aircraft contacted	FAA/AMS-420
General aviation aircraft contacted	FAA/AMS-420
Military aircraft contacted	FAA/AMS-420
IFR-DVFR aircraft contacted	FAA/AMS-420
VFR aircraft contacted	FAA/AMS-420
MILITARY	
FLEET:	
Jet	DOD
Turboprop	DOD
Piston	DOD
Helicopter	DOD
HOURS:	
Hours flown by equipment (See Fleet)	DOD

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS FISCAL YEARS 1989–2000

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS FISCAL YEARS 1989 - 2000

Chapter X provides the detailed data for the National Aviation and FAA workload series forecasted by the FAA Office of Aviation Policy and Plans. The following should be noted:

- o Table 6 - Contains the unduplicated passenger traffic reported by U.S. scheduled air carriers reporting on RSPA Form 41 and commuter carriers reporting on RSPA Form 298-C.

- o Table 7 - San Juan and Virgin Islands traffic is reported as domestic, beginning January 1, 1981.

  - Those carriers contained in the Air Carrier forecast data base are listed in Appendices A and B.

  - Includes the following traffic which is also reported as commuters/regionals traffic in Table 14.

	ENPLANEMENTS (Millions)	RPM'S (Millions)		ENPLANEMENTS (Millions)	RPM'S (Millions)
1980	4.199	627.4	1985	4.666	844.2
1981	5.642	906.2	1986	6.537	1,079.0
1982	4.478	732.1	1987	4.100	683.6
1983	2.410	455.4	1988E	3.134	581.3
1984	3.153	615.6			

- o Table 14 - Includes the duplicated traffic listed above for those air carriers and commuters/regionals reporting on both RSPA Forms 41 and 298-C.

  - Forecasts and historical data exclude Alaska and foreign territory traffic.

  - The forecasts exclude the following carriers because of the predominance of jet aircraft in their fleets : Altair (beginning in 1982), Empire (1985), and Air Wisconsin (1987).

- Table 15 - Includes only aircraft with 60 seats or less. Aircraft also included with general aviation fleet shown in Tables 16 and 17.

- Table 21 - Includes the rotorcraft fleet and hours flown shown in Tables 16 and 17.

TABLE 1

ECONOMIC FORECASTS USED IN DEVELOPING FAA FORECASTS

FISCAL YEAR	GROSS NATIONAL PRODUCT (Billions 1982$)	CONSUMER PRICE INDEX (1982-84 = 100)	OIL AND GAS DEFLATOR (1982 = 100)
Historical			
1980	3,187.7	80.0	90.4
1981	3,243.8	88.9	103.2
1982	3,181.0	95.5	101.6
1983	3,227.7	98.8	97.5
1984	3,451.1	102.8	95.9
1985	3,559.7	106.6	95.5
1986	3,693.1	109.2	82.4
1987	3,799.9	111.2	75.8
1988E	3,967.9	115.7	76.8
Forecast			
1989	4,087.6	120.3	64.5
1990	4,218.7	124.9	70.8
1991	4,360.7	129.0	74.9
1992	4,503.0	132.7	79.3
1993	4,647.1	135.7	83.6
1994	4,795.9	138.2	87.7
1995	4,913.5*	145.3*	93.6*
1996	5,021.5*	153.1*	100.9*
1997	5,121.6*	161.5*	109.0*
1998	5,237.2*	170.1*	118.2*
1999	5,356.5*	179.2*	128.2*
2000	5,474.2*	188.9*	139.0*

Source: Office of Management and Budget, June 1988

* Based on consensus growth rates of DRI, Evans, and Wharton Forecasts contained in Table 2.

TABLE 2

ALTERNATIVE ECONOMIC FORECASTS

CALENDAR YEAR	GROSS NATIONAL PRODUCT (Billions 1982$)			CONSUMER PRICE INDEX (1982-84 = 100)			FUEL PRICE INDEX (1982 = 100)		
	DRI	EVANS	WEFA	DRI	EVANS	WEFA	DRI	EVANS	WEFA
Historical									
1980	3,187.2	3,187.2	3,187.2	82.4	82.4	82.4	94.8	94.8	94.8
1981	3,248.7	3,248.7	3,248.7	90.9	90.9	90.9	105.6	105.6	105.6
1982	3,166.0	3,166.0	3,166.0	96.5	96.5	96.5	100.0	100.0	100.0
1983	3,279.1	3,279.1	3,279.1	99.8	99.6	99.8	96.7	96.8	96.7
1984	3,501.4	3,501.4	3,501.4	103.9	103.9	103.9	95.2	95.2	95.2
1985	3,618.7	3,618.7	3,618.7	107.6	107.6	107.6	96.0	96.0	96.0
1986	3,721.7	3,721.7	3,721.7	109.6	109.6	109.6	75.3	75.1	75.3
1987	3,847.0	3,847.0	3,847.0	113.6	113.6	113.6	79.5	79.4	79.4
1988E	3,997.4	3,997.7	3,998.3	118.3	118.3	118.3	79.4	79.1	77.3
Forecast									
1989	4,098.1	4,103.8	4,075.3	124.2	124.4	123.8	83.4	83.1	78.8
1990	4,163.8	4,194.8	4,152.2	130.2	131.0	129.8	87.8	86.2	81.6
1991	4,294.8	4,268.0	4,280.6	136.8	137.9	136.7	92.1	89.5	85.6
1992	4,409.3	4,360.4	4,397.8	143.9	145.2	143.0	97.8	93.2	91.2
1993	4,491.1	4,472.6	4,503.2	151.1	153.0	149.3	104.0	97.0	99.4
1994	4,588.6	4,594.2	4,626.3	158.8	161.2	156.1	110.7	100.9	107.6
1995	4,704.5	4,692.2	4,750.9	167.0	170.3	163.3	119.0	105.7	116.3
1996	4,823.6	4,767.5	4,867.6	175.8	180.7	171.0	128.3	111.2	127.9
1997	4,928.4	4,828.3	4,990.2	185.1	192.1	179.2	139.4	116.9	140.7
1998	5,038.4	4,929.7*	5,111.8	195.0	203.2*	187.8	151.8	122.9*	155.7
1999	5,150.6	5,033.2*	5,239.6	205.8	215.0*	196.8	166.4	129.1*	171.3
2000	5,252.8	5,138.9*	5,370.6	217.2	227.5*	206.3	182.2	135.7*	188.4

Source: Data Resources, Inc., Fall, 1988; Evans Economics, Inc., October 1988; and The WEFA Group, November 1988

* Extrapolated to 2000 for forecast purposes

TABLE 3

BASELINE AIR CARRIER FORECAST ASSUMPTIONS - TOTAL SYSTEM OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT $ (Cents)	REVENUE PER PASSENGER MILE 1982-84 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84 $ (Cents)
Historical*						
1980	155.1	851.5	10.37	12.96	86.5	108.1
1981	157.1	868.5	12.27	13.80	103.7	116.6
1982	164.0	878.6	11.96	12.52	100.5	105.2
1983	167.1	886.5	11.54	11.68	92.1	93.2
1984	167.3	885.1	12.29	11.96	86.2	83.9
1985	166.9	881.6	11.77	11.04	81.5	76.5
1986	167.4	874.8	11.02	10.09	64.6	59.2
1987	166.6	894.8	10.93	9.82	52.0	46.2
1988E	168.4	927.8	11.81	10.21	56.2	48.6
Forecast						
1989	170	934	12.23	10.17	47.2	39.2
1990	170	937	12.46	9.97	51.9	41.6
1991	172	944	12.75	9.89	54.9	42.6
1992	174	949	13.06	9.84	58.1	43.8
1993	177	953	13.37	9.85	61.2	45.1
1994	179	957	13.68	9.90	64.2	46.5
1995	182	962	14.21	9.78	68.6	47.2
1996	186	968	14.79	9.66	73.9	48.3
1997	189	972	15.41	9.54	79.9	49.5
1998	193	977	16.07	9.45	86.6	50.9
1999	196	982	16.74	9.34	93.9	52.4
2000	199	986	17.44	9.23	101.8	53.9

* Source: RSPA, Form 41

TABLE 4

BASELINE AIR CARRIER FORECAST ASSUMPTIONS - DOMESTIC OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT $ (Cents)	REVENUE PER PASSENGER MILE 1982-84 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84 $ (Cents)
Historical*						
1980	140.9	730.3	10.82	13.53	83.2	104.0
1981	143.6	748.0	12.93	14.54	100.8	113.4
1982	150.7	761.6	12.47	13.06	98.3	102.9
1983	153.6	769.3	11.90	12.04	90.3	91.4
1984	153.4	758.6	13.00	12.65	85.1	82.8
1985	152.3	758.6	12.36	11.59	80.7	75.7
1986	153.0	764.1	11.33	10.38	63.5	58.2
1987	152.5	775.4	11.20	10.07	50.8	45.7
1988E	153.0	785.9	12.23	10.57	55.1	47.6
Forecast						
1989	153	787	12.75	10.60	46.3	38.5
1990	154	788	12.96	10.38	50.9	40.8
1991	155	792	13.27	10.29	53.8	41.7
1992	157	795	13.60	10.25	57.0	43.0
1993	159	797	13.94	10.27	60.0	44.2
1994	161	799	14.29	10.34	63.0	45.6
1995	164	801	14.86	10.23	67.3	46.3
1996	167	804	15.49	10.12	72.5	47.4
1997	170	805	16.15	10.00	78.3	48.5
1998	173	808	16.86	9.91	84.9	49.9
1999	176	810	17.59	9.82	92.1	51.4
2000	179	812	18.34	9.71	99.9	52.9

* Source: RSPA, Form 41

TABLE 5

BASELINE AIR CARRIER FORECAST ASSUMPTIONS - INTERNATIONAL OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT $ (Cents)	REVENUE PER PASSENGER MILE 1982-84 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84 $ (Cents)
Historical*						
1980	257.4	2,250.2	8.67	10.84	96.8	121.0
1981	264.7	2,365.5	9.75	10.97	113.1	127.2
1982	268.1	2,495.2	9.92	10.39	109.6	114.8
1983	279.2	2,506.8	9.99	10.11	99.7	100.9
1984	283.1	2,594.1	9.63	9.37	91.3	88.8
1985	290.5	2,636.2	9.38	8.80	84.9	79.6
1986	290.2	2,605.7	9.63	8.82	69.1	63.1
1987	279.7	2,583.9	9.76	8.78	56.9	51.2
1988E	278.9	2,644.2	10.31	8.91	60.2	52.0
Forecast						
1989	280	2,667	10.43	8.67	50.6	42.1
1990	282	2,681	10.73	8.59	55.6	44.5
1991	284	2,701	10.99	8.52	58.8	45.6
1992	287	2,714	11.22	8.45	62.2	46.9
1993	290	2,731	11.46	8.45	65.6	48.3
1994	293	2,746	11.67	8.44	68.8	49.8
1995	296	2,764	12.10	8.33	73.5	50.6
1996	299	2,781	12.57	8.21	79.2	51.3
1997	302	2,793	13.08	8.10	85.5	52.9
1998	304	2,816	13.59	7.99	92.7	54.5
1999	307	2,834	14.13	7.89	100.6	56.1
2000	310	2,851	14.70	7.78	109.1	57.8

* Source: RSPA, Form 41

TABLE 6

UNITED STATES COMMERCIAL AIR CARRIERS AND REGIONALS/COMMUTERS
TOTAL SCHEDULED PASSENGER TRAFFIC 1/

	REVENUE PASSENGER ENPLANEMENTS (Millions)			REVENUE PASSENGER MILES (Billions)		
FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1980	287.9	24.1	312.0	204.4	54.2	258.6
1981	274.7	21.2	295.9	199.2	50.3	249.5
1982	286.1	19.7	305.8	209.5	49.2	258.7
1983	308.2	21.1	329.3	226.0	52.8	278.8
1984	334.0	23.3	357.3	240.7	60.3	301.0
1985	370.1	24.6	394.7	268.8	64.8	333.6
1986	404.7	24.6	429.3	297.4	64.1	361.5
1987	441.2	29.4	470.6	325.8	76.0	401.8
1988E	441.6	34.3	475.9	329.7	90.5	420.2
Forecast						
1989	461.0	36.6	497.6	344.2	97.6	441.8
1990	479.6	38.2	517.8	358.0	102.5	460.5
1991	506.1	40.8	546.9	379.3	110.0	489.3
1992	532.8	43.3	576.1	400.4	117.2	517.6
1993	558.2	45.7	603.9	420.3	124.7	545.0
1994	587.6	48.4	636.0	443.1	132.6	575.7
1995	615.0	51.0	666.0	464.6	140.7	605.3
1996	640.1	53.8	693.9	484.9	149.5	634.4
1997	662.9	56.5	719.4	502.2	157.1	659.3
1998	693.9	58.9	752.8	527.4	165.4	692.8
1999	721.0	62.0	783.0	551.3	175.4	726.7
2000	754.7	65.3	820.0	575.8	185.6	761.4

* Source: RSPA, Forms 41 and 298-C

1/ Sum of Table's 7 and 14 less duplicated traffic. See note on page 123.

TABLE 7

UNITED STATES COMMERCIAL AIR CARRIERS
SCHEDULED PASSENGER TRAFFIC

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS (Millions)			REVENUE PASSENGER MILES (Billions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1980	278.2	24.1	302.3	203.2	54.2	257.4
1981	264.7	21.2	285.9	198.0	50.3	248.3
1982	272.8	19.7	292.5	207.8	49.2	257.0
1983	290.7	21.1	311.8	223.6	52.8	276.4
1984	313.4	23.3	336.7	237.7	60.3	298.0
1985	350.4	24.6	375.0	265.8	64.8	330.6
1986	385.2	24.6	409.8	294.4	64.1	358.5
1987	415.5	29.4	444.9	322.1	76.0	398.1
1988E	414.2	34.3	448.5	325.5	90.5	416.0
Forecast						
1989	431.4	36.6	468.0	339.5	97.6	437.1
1990	447.8	38.2	486.0	352.9	102.5	455.4
1991	471.8	40.8	512.6	373.7	110.0	483.7
1992	496.0	43.2	539.2	394.3	117.2	511.5
1993	518.9	45.6	564.5	413.6	124.7	538.3
1994	545.6	48.3	593.9	435.9	132.6	568.5
1995	570.4	50.9	621.3	456.9	140.6	597.5
1996	592.8	53.7	646.5	476.6	149.4	626.0
1997	612.8	56.3	669.1	493.3	157.0	650.3
1998	641.0	58.7	699.7	517.9	165.3	683.2
1999	668.1	61.8	729.9	541.2	175.3	716.5
2000	695.8	65.1	760.9	565.0	185.4	750.4

* Source: RSPA, Form 41

TABLE 8

UNITED STATES COMMERCIAL AIR CARRIERS
SCHEDULED INTERNATIONAL PASSENGER TRAFFIC

	REVENUE PASSENGER ENPLANEMENTS (MIL)				REVENUE PASSENGER MILES (BIL)			
FISCAL YEAR	ATLANTIC	LATIN AMERICA	PACIFIC	TOTAL	ATLANTIC	LATIN AMERICA	PACIFIC	TOTAL
Historical*								
1980	8.5	12.3	3.4	24.2	24.7	16.3	13.1	54.1
1981	8.4	9.4	3.3	21.1	25.3	12.3	12.7	50.3
1982	8.3	8.0	3.4	19.7	25.7	10.0	13.3	49.0
1983	8.8	8.2	4.0	21.0	27.2	10.0	14.9	52.1
1984	10.1	8.2	4.6	22.9	32.0	10.2	17.5	59.7
1985	11.4	7.9	5.0	24.3	36.1	9.7	18.6	64.4
1986	10.5	8.5	5.4	24.4	32.6	11.1	20.3	64.0
1987	12.4	10.4	6.6	29.4	38.5	13.0	24.5	76.0
1988E	14.6	11.5	8.2	34.3	46.1	14.2	30.2	90.5
Forecast								
1989	15.5	12.0	9.1	36.6	49.1	14.8	33.7	97.6
1990	16.1	12.3	9.8	38.2	51.0	15.3	36.2	102.5
1991	17.0	13.0	10.8	40.8	53.9	16.1	40.0	110.0
1992	17.8	13.7	11.7	43.2	56.8	17.0	43.4	117.2
1993	18.7	14.2	12.7	45.6	59.8	17.8	47.1	124.7
1994	19.6	14.9	13.8	48.3	62.7	18.7	51.2	132.6
1995	20.5	15.5	14.9	50.9	65.5	19.5	55.6	140.6
1996	21.4	16.1	16.2	53.7	68.6	20.4	60.4	149.4
1997	22.2	16.8	17.3	56.3	71.1	21.3	64.6	157.0
1998	23.0	17.1	18.6	58.7	73.9	21.8	69.6	165.3
1999	24.0	17.7	20.1	61.8	77.4	22.7	75.2	175.3
2000	25.1	18.4	21.6	65.1	80.9	23.6	80.9	185.4

* Source: RSPA, Form 41

TABLE 9

UNITED STATES COMMERCIAL AIR CARRIERS
SCHEDULED PASSENGER CAPACITY, TRAFFIC AND LOAD FACTORS

	DOMESTIC			INTERNATIONAL		
FISCAL YEAR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR
Historical*						
1980	349.0	203.2	58.2	86.8	54.2	62.5
1981	343.4	198.0	57.7	79.5	50.3	63.3
1982	355.9	207.8	58.4	79.6	49.2	61.8
1983	374.4	223.6	59.7	82.6	52.8	64.0
1984	411.7	237.7	57.7	91.1	60.3	66.2
1985	436.8	265.8	60.9	98.6	64.8	65.8
1986	488.4	294.4	60.3	108.3	64.1	59.2
1987	521.9	322.1	61.7	117.5	76.0	64.7
1988E	533.3	325.5	61.0	135.4	90.5	66.9
Forecast						
1989	554.5	339.5	61.2	146.8	97.6	66.5
1990	576.7	352.9	61.2	155.6	102.5	65.9
1991	602.6	373.7	62.0	165.1	110.0	66.6
1992	627.9	394.3	62.8	175.1	117.2	66.9
1993	654.9	413.6	63.2	185.6	124.7	67.2
1994	682.9	435.9	63.8	196.6	132.6	67.4
1995	711.1	456.9	64.3	208.2	140.6	67.5
1996	741.2	476.6	64.3	220.5	149.4	67.8
1997	772.0	493.3	63.9	232.9	157.0	67.4
1998	802.7	517.9	64.5	245.5	165.3	67.3
1999	834.8	541.2	64.8	258.9	175.4	67.7
2000	868.2	565.0	65.1	272.6	185.4	68.0

* Source: RSPA, Form 41

TABLE 10

UNITED STATES COMMERCIAL AIR CARRIERS
LARGE JET AIRCRAFT

AS OF JANUARY 1	NARROW BODY			WIDE BODY			TOTAL
	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	
Historical*							
1980	615	1,029	380	12	227	131	2,394
1981	663	1,097	297	19	255	144	2,475
1982	730	1,096	218	25	267	147	2,483
1983	839	1,057	199	43	277	141	2,556
1984	962	1,122	161	83	271	146	2,745
1985	1,074	1,161	179	91	277	156	2,938
1986	1,238	1,195	171	111	293	160	3,168
1987	1,460	1,160	193	130	298	160	3,401
1988	1,578	1,135	221	153	296	159	3,542
Forecast							
1989	1,792	1,188	255	183	296	172	3,886
1990	1,975	1,163	253	208	296	178	4,073
1991	2,069	1,138	236	227	303	188	4,161
1992	2,143	1,103	220	249	310	198	4,223
1993	2,231	1,053	204	281	316	213	4,298
1994	2,301	983	189	319	325	229	4,346
1995	2,379	915	181	354	335	245	4,409
1996	2,459	843	173	393	344	260	4,472
1997	2,527	775	162	447	352	274	4,537
1998	2,603	702	148	501	361	289	4,604
1999	2,706	626	133	550	370	304	4,689
2000	2,822	554	118	599	378	320	4,791

* Source: FAA Aircraft Utilization and Propulsion Reliability Report

TABLE 11

UNITED STATES COMMERCIAL AIR CARRIERS
TOTAL AIRBORNE HOURS
(Thousands)

	NARROW BODY			WIDE BODY			
FISCAL YEAR	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	TOTAL
Historical*							
1980	1,579	2,993	690	38	712	525	6,537
1981	1,672	2,807	388	58	716	501	6,142
1982	1,860	2,635	254	67	742	510	6,068
1983	2,188	2,573	323	160	772	533	6,549
1984	2,551	2,805	301	260	787	545	7,249
1985	2,915	2,887	239	309	829	539	7,718
1986	3,644	2,985	323	381	890	551	8,774
1987	4,051	2,968	412	458	943	565	9,397
1988E	4,359	2,819	439	557	961	612	9,747
Forecast							
1989	4,817	2,734	430	643	946	630	10,200
1990	5,202	2,700	415	714	951	655	10,637
1991	5,462	2,650	393	789	975	681	10,950
1992	5,735	2,592	372	883	999	711	11,292
1993	6,022	2,436	349	1,012	1,019	751	11,589
1994	6,233	2,253	330	1,137	1,035	792	11,780
1995	6,438	2,073	316	1,257	1,050	839	11,973
1996	6,657	1,824	298	1,408	1,064	881	12,132
1997	6,870	1,624	276	1,590	1,082	921	12,363
1998	7,144	1,461	251	1,766	1,100	961	12,683
1999	7,430	1,271	226	1,925	1,117	1,001	12,970
2000	7,727	1,074	206	2,059	1,318	1,036	13,420

* Source: RSPA, Form 41

TABLE 12

TOTAL JET FUEL AND AVIATION GASOLINE FUEL CONSUMPTION
UNITED STATES CIVIL AVIATION AIRCRAFT
(Millions of Gallons)

FISCAL YEAR	JET FUEL					AVIATION GASOLINE			TOTAL FUEL CONSUMED
	U.S. AIR CARRIERS			GENERAL AVIATION	TOTAL	AIR CARRIER	GENERAL AVIATION	TOTAL	
	DOMESTIC	INT'L.	TOTAL						
Historical*									
1980	9,126	2,136	11,262	758	12,020	13	533	546	12,565
1981	8,376	1,881	10,257	761	11,018	11	497	508	11,526
1982	8,242	1,797	10,039	855	10,894	9	458	467	11,361
1983	8,697	1,972	10,669	681	11,350	7	433	440	11,790
1984	9,478	2,176	11,654	707	12,361	6	454	460	12,821
1985	9,906	2,387	12,293	702	12,995	5	437	442	13,437
1986	10,733	2,525	13,258	738	13,996	5	411	416	14,412
1987	11,487	2,765	14,252	662	14,914	4	395	399	15,313
1988E	11,902	3,192	15,094	654	15,748	4	395	399	16,147
Forecast									
1989	12,140	3,523	15,663	695	16,358	3	395	398	16,756
1990	12,459	3,658	16,117	727	16,844	3	398	401	17,245
1991	12,858	3,820	16,678	772	17,450	2	399	401	17,851
1992	13,242	3,956	17,198	806	18,004	2	400	402	18,406
1993	13,610	4,088	17,698	841	18,539	2	404	406	18,945
1994	13,986	4,226	18,212	882	19,094	2	404	406	19,500
1995	14,445	4,389	18,834	914	19,748	2	404	406	20,154
1996	14,795	4,520	19,315	930	20,245	2	405	407	20,652
1997	14,884	4,572	19,456	959	20,415	2	408	410	20,825
1998	15,127	4,673	19,800	970	20,770	2	408	410	21,180
1999	15,362	4,772	20,134	1,003	21,137	2	409	411	21,548
2000	15,584	4,868	20,452	1,018	21,470	2	410	412	21,882

* Source: Air carrier jet fuel, RSPA Form 41; All others, FAA APO estimates

TABLE 13

BASELINE REGIONALS/COMMUTERS FORECAST ASSUMPTIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH 48 STATES (Miles)	AVERAGE PASSENGER TRIP LENGTH HA/P.R./V.I. (Miles)	AVERAGE PASSENGER LOAD FACTOR (Percent)
Historical*				
1980	15.1	135.2	71.9	45.5
1981	15.9	141.1	76.0	43.4
1982	16.9	146.0	95.2	44.0
1983	18.2	151.9	96.0	45.6
1984	19.1	160.5	98.9	46.2
1985	19.4	162.4	98.9	44.3
1986	20.2	158.9	99.1	45.6
1987	19.7	161.2	97.6	46.0
1988E	19.2	160.0	84.9	46.4
Forecast				
1989	20.3	165.6	86.0	45.5
1990	21.1	170.1	87.0	45.7
1991	21.9	174.2	88.0	46.0
1992	22.8	177.8	88.0	46.1
1993	24.0	179.7	90.0	46.5
1994	25.1	182.0	90.0	46.2
1995	26.0	184.3	91.0	46.5
1996	27.0	186.6	91.0	45.5
1997	28.0	188.8	91.0	46.7
1998	28.8	191.0	91.0	46.9
1999	29.8	193.0	91.0	47.2
2000	30.9	195.0	91.0	47.3

* Source: RSPA, Form's 298-C and 41

TABLE 14

UNITED STATES REGIONALS/COMMUTERS
SCHEDULED PASSENGER TRAFFIC
(Millions)

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS 48 STATES	HAWAII/ PUERTO RICO/ VIRGIN ISLANDS	TOTAL	REVENUE PASSENGER MILES 48 STATES	HAWAII/ PUERTO RICO/ VIRGIN ISLANDS	TOTAL
Historical*						
1980	12.4 (11.4)	1.5	13.9 (12.9)	1,676.1 (1,522.2)	107.8	1,783.9 (1,630.0)
1981	14.2 (12.9)	1.8	16.0 (14.7)	2,004.0 (1,756.8)	136.8	2,140.8 (1,893.6)
1982	15.6 (14.3)	2.2	17.8 (16.5)	2,278.3 (2,042.4)	187.4	2,465.7 (2,229.8)
1983	17.8 (16.9)	2.5	20.3 (19.4)	2,703.1 (2,436.2)	240.1	2,943.2 (2,676.3)
1984	21.0 (19.0)	2.8	23.8 (21.8)	3,369.6 (2,998.8)	276.8	3,646.4 (3,275.6)
1985	21.9 (20.5)	2.5	24.4 (23.0)	3,555.6 (3,318.3)	247.2	3,802.8 (3,565.5)
1986	23.3 (21.3)	2.7	26.0 (24.0)	3,769.0 (3,378.5)	267.7	4,036.7 (3,646.2)
1987	25.6	2.4	28.0	4,127.2	234.2	4,361.4
1988E	28.8	1.7	30.5	4,608.0	144.3	4,752.3
Forecast						
1989	31.0	1.9	32.9	5,133.6	163.4	5,297.0
1990	33.2	2.2	35.4	5,647.3	191.4	5,838.7
1991	35.7	2.5	38.2	6,218.9	220.0	6,438.9
1992	38.2	2.8	41.0	6,769.0	246.4	7,015.4
1993	40.6	3.1	43.7	7,295.8	279.0	7,574.8
1994	43.3	3.4	46.7	7,880.6	306.0	8,186.6
1995	45.9	3.7	49.6	8,459.4	336.7	8,796.1
1996	48.7	4.0	52.7	9,087.4	364.0	9,451.4
1997	51.6	4.2	55.8	9,742.1	382.2	10,124.3
1998	54.5	4.4	58.9	10,409.5	400.4	10,809.9
1999	57.6	4.6	62.2	11,116.8	418.6	11,535.4
2000	60.8	4.8	65.6	11,856.0	436.8	12,292.8

* Source: RSPA, Form's 298-C and 41

Note: Numbers in paranthesis represent the removal of Altair, Air Wisconsin and Empire from the historical series.

TABLE 15

UNITED STATES REGIONALS/COMMUTERS
PASSENGER AIRCRAFT

AS OF JANUARY 1	LESS THAN 15 SEATS	15 TO 19 SEATS	20 TO 40 SEATS	MORE THAN 40 SEATS	TOTAL
Historical*					
1980	861	365	101	86	1,413
1981	734	383	99	97	1,313
1982	716	433	117	122	1,388
1983	701	493	125	175	1,494
1984	569	533	147	172	1,421
1985	624	561	162	204	1,551
1986	564	615	200	159	1,538
1987	581	652	213	158	1,604
1988E	573	740	251	120	1,684
Forecast					
1989	522	800	280	135	1,737
1990	471	837	310	153	1,771
1991	426	862	350	176	1,814
1992	392	863	391	203	1,849
1993	362	847	433	259	1,901
1994	334	826	475	303	1,938
1995	304	805	512	346	1,967
1996	273	789	557	388	2,007
1997	239	765	601	434	2,039
1998	211	749	637	476	2,073
1999	180	727	674	528	2,109
2000	150	689	710	587	2,136

* Source: FAA Aircraft Utilization and Propulsion Reliability Report

TABLE 16

ACTIVE GENERAL AVIATION AIRCRAFT
(Thousands)

AS OF JANUARY 1	FIXED WING				ROTORCRAFT		OTHER	TOTAL
	PISTON							
	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE		
Historical*								
1980	168.4	25.1	3.5	2.7	3.1	2.7	4.8	210.3
1981	168.4	24.6	4.1	3.0	2.8	3.2	4.9	211.0
1982	167.9	25.5	4.7	3.2	3.3	3.7	5.0	213.3
1983	164.2	25.0	5.2	4.0	2.4	3.7	5.2	209.7
1984	166.4	25.1	5.5	3.9	2.5	4.0	5.9	213.3
1985	171.9	25.5	5.8	4.3	2.9	4.2	6.3	220.9
1986	164.4	23.8	5.4	4.4	2.9	3.5	6.3	210.7
1987	171.8	23.9	6.0	4.5	2.9	4.0	7.0	220.0
1988E	171.0	23.4	5.3	4.4	2.8	3.5	6.8	217.2
Forecast								
1989	169.5	23.3	5.9	4.5	2.7	4.1	7.1	217.1
1990	167.9	23.2	6.3	4.8	2.8	4.3	7.4	216.7
1991	166.4	23.0	6.7	5.0	2.8	5.0	7.7	216.6
1992	165.8	22.9	6.8	5.2	2.7	5.0	8.0	216.4
1993	164.9	22.8	6.9	5.5	2.6	5.4	8.3	216.4
1994	164.3	22.8	7.1	5.8	2.6	5.7	8.6	216.9
1995	163.8	22.9	7.4	6.1	2.6	6.1	8.9	217.8
1996	163.3	23.0	7.7	6.3	2.6	6.6	9.2	218.7
1997	162.8	23.1	7.9	6.5	2.5	6.8	9.3	218.9
1998	162.5	23.2	8.1	6.7	2.4	7.2	9.5	219.6
1999	162.3	23.3	8.3	6.9	2.4	7.6	9.6	220.4
2000	162.0	23.4	8.5	7.1	2.3	8.0	9.8	221.1

* Source: FAA Statistical Handbook of Aviation

Notes: Detail may not add to total because of independent rounding.

An active aircraft must have a current registration and it must have been flown at least one hour during the previous calendar year.

TABLE 17

ACTIVE GENERAL AVIATION AIRCRAFT
BY FAA REGION
(Thousands)

AS OF JANUARY 1	FAA REGION									
	ANE	AEA	ASO	AGL	ACE	ASW	AWP	ANM	AAL	TOTAL
Historical*										
1980	7.4	22.9	29.7	39.7	14.1	30.9	35.3	24.4	5.9	210.3
1981	7.4	23.0	29.8	39.9	14.1	31.0	35.4	24.5	5.9	211.0
1982	7.0	21.2	32.1	40.0	14.0	32.2	36.7	23.8	6.2	213.2
1983	7.7	22.8	32.2	37.0	12.8	34.0	34.4	22.1	6.8	209.8
1984	7.8	23.2	32.7	37.6	13.0	34.6	35.0	22.5	6.9	213.3
1985	8.2	23.9	33.3	38.8	13.1	34.6	37.6	23.8	7.6	220.9
1986	8.0	22.7	32.8	37.5	12.4	32.7	36.9	21.2	6.5	210.7
1987	9.0	25.5	33.5	37.8	13.1	32.7	38.8	22.0	7.6	220.0
1988E	9.1	24.1	34.8	38.6	13.2	30.5	38.0	21.2	7.6	217.1
Forecast										
1989	9.0	24.1	34.8	38.6	13.3	30.6	38.0	21.2	7.5	217.1
1990	8.9	24.0	34.9	38.4	13.1	30.7	38.0	21.3	7.4	216.7
1991	8.9	24.0	34.9	38.2	13.0	30.8	38.1	21.3	7.4	216.6
1992	8.9	23.9	35.0	38.0	12.9	30.8	38.2	21.4	7.3	216.4
1993	9.0	23.9	35.0	37.8	12.8	30.9	38.3	21.4	7.3	216.4
1994	9.0	23.9	35.1	37.8	12.8	31.0	38.4	21.5	7.4	216.9
1995	9.0	24.0	35.2	38.0	12.9	31.2	38.5	21.6	7.4	217.8
1996	9.1	24.0	35.4	38.1	13.0	31.4	38.6	21.7	7.4	218.7
1997	9.1	24.0	35.4	38.1	13.0	31.5	38.7	21.7	7.4	218.9
1998	9.1	24.1	35.5	38.1	13.1	31.6	38.8	21.8	7.5	219.6
1999	9.2	24.1	35.7	38.2	13.1	31.8	39.0	21.8	7.5	220.4
2000	9.2	24.1	35.9	38.2	13.1	32.0	39.2	21.9	7.5	221.1

* Source: FAA Statistical Handbook of Aviation

Notes: Detail may not add to total because of independent rounding.

TABLE 18

GENERAL AVIATION HOURS FLOWN
(Millions)

	FIXED WING							
	PISTON				ROTORCRAFT			
FISCAL YEAR	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
1980	28.8	6.6	2.1	1.3	0.9	1.8	0.4	41.9
1981	27.9	6.4	2.2	1.5	0.8	1.8	0.4	41.0
1982	25.2	6.0	2.1	1.6	0.6	1.8	0.4	37.7
1983	23.8	5.8	2.2	1.5	0.6	1.7	0.4	36.0
1984	23.4	5.7	2.4	1.6	0.6	1.9	0.4	36.0
1985	23.4	5.7	2.6	1.8	0.6	1.7	0.4	36.2
1986	22.2	4.9	2.7	1.7	0.8	1.8	0.4	34.5
1987	22.1	4.9	2.4	1.6	0.7	1.6	0.4	33.7
1988E	22.1	4.9	2.3	1.6	0.7	1.6	0.4	33.6
Forecast								
1989	22.2	4.9	2.4	1.7	0.6	1.8	0.4	34.0
1990	22.2	5.0	2.4	1.8	0.6	2.0	0.4	34.4
1991	22.3	5.0	2.5	1.9	0.6	2.3	0.4	35.0
1992	22.4	5.0	2.6	2.0	0.6	2.3	0.4	35.3
1993	22.5	5.1	2.6	2.1	0.6	2.6	0.4	35.9
1994	22.6	5.1	2.7	2.2	0.5	2.8	0.5	36.4
1995	22.6	5.1	2.7	2.3	0.5	3.0	0.5	36.7
1996	22.7	5.1	2.8	2.3	0.5	3.2	0.5	37.1
1997	22.7	5.2	2.8	2.4	0.5	3.3	0.6	37.5
1998	22.8	5.2	2.9	2.4	0.4	3.4	0.6	37.7
1999	22.9	5.2	2.9	2.5	0.4	3.6	0.6	38.1
2000	23.0	5.2	3.0	2.5	0.4	3.8	0.7	38.6

* Source: FAA Statistical Handbook of Aviation

Notes: Detail may not add to total because of independent rounding.

TABLE 19

ACTIVE PILOTS BY TYPE OF CERTIFICATE
(Thousands)

AS OF JANUARY 1	STUDENTS	PRIVATE	COMMERCIAL	AIRLINE TRANSPORT	HELICOPTER	GLIDER	LIGHTER-THAN-AIR	TOTAL	INSTRUMENT RATED(1)
Historical*									
1980	210.2	343.3	182.1	63.7	5.2	6.8	3.4	814.7	247.1
1981	199.8	357.5	183.4	69.6	6.0	7.0	3.7	827.0	260.5
1982	179.9	328.6	168.6	70.3	6.5	7.4	3.0	764.2	252.5
1983	156.4	322.1	165.1	73.5	7.0	7.8	1.4	733.3	255.1
1984	147.2	318.6	159.5	75.9	7.2	8.2	1.3	718.0	254.3
1985	150.1	320.1	155.9	79.2	7.5	8.4	1.2	722.4	256.6
1986	146.7	311.1	151.6	82.7	8.1	8.2	1.1	709.5	258.6
1987	150.3	305.7	147.8	87.2	8.6	8.4	1.1	709.1	262.4
1988E	146.0	300.9	143.6	91.3	8.7	7.9	1.2	699.7	266.1
Forecast									
1989	147.7	301.2	144.3	95.6	8.8	8.0	1.2	706.8	270.9
1990	150.6	301.8	145.0	100.1	8.9	8.2	1.2	715.8	275.8
1991	153.2	302.7	146.5	103.8	9.0	8.3	1.2	724.7	279.9
1992	155.5	303.3	148.0	107.6	9.1	8.4	1.2	733.1	284.1
1993	157.4	303.9	149.4	111.6	9.3	8.5	1.3	741.4	288.4
1994	158.9	304.8	150.9	115.7	9.4	8.6	1.4	749.7	291.9
1995	160.1	305.7	152.4	118.9	9.5	8.7	1.5	756.8	295.4
1996	160.9	306.7	154.0	122.1	9.6	8.8	1.6	763.7	298.9
1997	161.5	307.6	155.5	125.4	9.7	8.9	1.7	770.3	302.5
1998	162.0	308.5	157.1	127.9	9.8	9.0	1.8	776.1	304.9
1999	162.5	309.4	158.6	130.4	9.9	9.1	1.9	781.8	306.4
2000	163.0	310.4	160.2	133.0	10.0	9.2	2.0	787.8	308.0

* Source: FAA Statistical Handbook of Aviation.

(1) Instrument rated pilots should not be added to other categories in deriving total.

Notes: Detail may not add to total because of independent rounding.

TABLE 20

GENERAL AVIATION AIRCRAFT FUEL CONSUMPTION
(Millions of Gallons)

	FIXED WING				ROTORCRAFT			
	Piston							
FISCAL YEAR	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
1980	287.6	231.1	223.9	474.6	13.3	59.7	0.8	1,291.0
1981	276.5	206.1	219.6	483.2	13.3	57.8	0.8	1,257.3
1982	251.2	197.4	230.8	562.1	9.7	62.5	0.5	1,314.2
1983	235.1	189.3	230.9	396.2	7.8	54.2	0.4	1,113.9
1984	248.8	196.3	236.4	408.0	8.5	62.9	0.2	1,161.1
1985	249.4	178.4	210.2	433.2	8.7	58.9	0.1	1,138.9
1986	242.0	157.8	230.0	451.4	11.0	56.7	0.1	1,149.0
1987	236.5	148.5	197.3	409.4	10.1	55.4	0.1	1,057.3
1988E	236.5	148.5	189.1	409.4	10.1	55.4	0.1	1,049.1
Forecast								
1989	237.5	148.5	197.3	435.0	8.6	62.3	0.1	1,089.3
1990	237.5	151.5	197.3	460.6	8.6	69.2	0.1	1,124.8
1991	238.6	151.5	205.5	486.2	8.6	80.0	0.1	1,170.5
1992	239.7	151.5	213.7	511.8	8.6	80.0	0.1	1,205.4
1993	240.8	154.5	213.7	537.4	8.6	90.0	0.1	1,245.1
1994	241.8	154.5	221.9	563.0	7.2	96.9	0.1	1,285.4
1995	241.8	154.5	221.9	588.6	7.2	103.8	0.1	1,317.9
1996	242.9	154.5	230.2	588.6	7.2	110.7	0.1	1,334.2
1997	242.9	157.6	230.2	614.2	7.2	114.2	0.2	1,366.5
1998	244.0	157.6	238.4	614.2	5.8	117.6	0.2	1,377.8
1999	245.0	157.6	238.4	639.8	5.8	124.6	0.2	1,411.4
2000	246.0	157.6	246.6	639.8	5.8	131.5	0.2	1,427.5

* Source: FAA APO Estimates

TABLE 21

ACTIVE ROTORCRAFT FLEET AND HOURS FLOWN

AS OF JANUARY 1	ACTIVE FLEET (Thousands) PISTON	TURBINE	TOTAL	HOURS FLOWN(1) (Millions) PISTON	TURBINE	TOTAL
Historical*						
1980	3.1	2.7	5.8	0.9	1.8	2.7
1981	2.8	3.2	6.0	0.8	1.8	2.6
1982	3.3	3.7	7.0	0.6	1.8	2.4
1983	2.4	3.7	6.1	0.6	1.7	2.3
1984	2.5	4.0	6.5	0.6	1.9	2.5
1985	2.9	4.2	7.1	0.6	1.7	2.3
1986	2.9	3.5	6.4	0.8	1.8	2.6
1987	2.9	4.0	6.9	0.7	1.6	2.3
1988E	2.8	3.5	6.3	0.7	1.6	2.3
Forecast						
1989	2.7	4.1	6.8	0.6	1.8	2.4
1990	2.8	4.3	7.1	0.6	2.0	2.6
1991	2.8	5.0	7.8	0.6	2.3	2.9
1992	2.7	5.0	7.7	0.6	2.3	2.9
1993	2.6	5.4	8.0	0.6	2.6	3.2
1994	2.6	5.7	8.3	0.5	2.8	3.3
1995	2.6	6.1	8.7	0.5	3.0	3.5
1996	2.6	6.6	9.2	0.5	3.2	3.7
1997	2.5	6.8	9.3	0.5	3.3	3.8
1998	2.4	7.2	9.6	0.4	3.4	3.8
1999	2.4	7.6	10.0	0.4	3.6	4.0
2000	2.3	8.0	10.3	0.4	3.8	4.2

* Source: FAA Statistical Handbook of Aviation

(1) Helicopter hours flown are on a fiscal year basis.

TABLE 22

TOTAL AIRCRAFT OPERATIONS
AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE
(Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	NUMBER OF FAA TOWERS
Historical*						
1980	10.1	4.6	48.9	2.5	66.2	432
1981	9.5	4.9	44.6	2.5	61.5	433
1982	9.0	5.1	34.2	2.3	50.6	375
1983	9.7	5.9	35.3	2.5	53.3	390
1984	10.9	6.6	36.8	2.4	56.8	403
1985	11.3	6.9	37.2	2.5	57.9	398
1986	12.3	6.9	37.1	2.6	59.0	399
1987	13.1	7.3	37.8	2.7	61.0	399
1988E	12.7	8.3	37.4	2.8	61.2	399
Forecast						
1989	13.2	8.8	37.9	2.8	62.7	399
1990	13.6	9.2	38.4	2.8	64.0	399
1991	14.0	9.7	39.3	2.8	65.8	399
1992	14.4	10.2	40.3	2.8	67.7	399
1993	14.8	10.6	41.2	2.8	69.4	399
1994	15.2	10.9	42.1	2.8	71.0	399
1995	15.5	11.2	43.0	2.8	72.5	399
1996	15.8	11.5	44.0	2.8	74.1	399
1997	16.1	11.8	44.8	2.8	75.5	399
1998	16.5	12.0	45.7	2.8	77.0	399
1999	16.8	12.3	46.7	2.8	78.6	399
2000	17.1	12.6	47.7	2.8	80.2	399

* Source: FAA Air Traffic Activity.

Notes: 1982-1984 operations reflect the temporary closures of FAA Air Traffic Control Towers. Detail may not add to total because of independent rounding.

TABLE 23

ITINERANT AIRCRAFT OPERATIONS
AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE
(Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1980	10.1	4.6	28.3	1.2	44.2
1981	9.5	4.9	26.4	1.2	42.0
1982	9.0	5.1	20.7	1.1	36.0
1983	9.7	5.9	21.3	1.2	38.0
1984	10.9	6.6	22.2	1.2	41.0
1985	11.3	6.9	22.4	1.3	41.9
1986	12.3	6.9	21.9	1.4	42.5
1987	13.1	7.3	22.1	1.4	43.9
1988E	12.7	8.3	22.0	1.4	44.4
Forecast					
1989	13.2	8.8	22.3	1.4	45.7
1990	13.6	9.2	22.6	1.4	46.8
1991	14.0	9.7	23.2	1.4	48.3
1992	14.4	10.2	23.8	1.4	49.8
1993	14.8	10.6	24.4	1.4	51.2
1994	15.2	10.9	25.0	1.4	52.5
1995	15.5	11.2	25.6	1.4	53.7
1996	15.8	11.5	26.2	1.4	54.9
1997	16.1	11.8	26.7	1.4	56.0
1998	16.5	12.0	27.3	1.4	57.2
1999	16.8	12.3	27.9	1.4	58.4
2000	17.1	12.6	28.5	1.4	59.6

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 24

LOCAL AIRCRAFT OPERATIONS
AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE
(Millions)

FISCAL YEAR	GENERAL AVIATION	MILITARY	TOTAL
Historical*			
1980	20.6	1.3	21.9
1981	18.2	1.3	19.5
1982	13.5	1.2	14.7
1983	14.0	1.3	15.3
1984	14.6	1.2	15.8
1985	14.8	1.2	16.0
1986	15.2	1.3	16.4
1987	15.8	1.3	17.1
1988E	15.4	1.4	16.8
Forecast			
1989	15.6	1.4	17.0
1990	15.8	1.4	17.2
1991	16.1	1.4	17.5
1992	16.5	1.4	17.9
1993	16.8	1.4	18.2
1994	17.1	1.4	18.5
1995	17.4	1.4	18.8
1996	17.8	1.4	19.2
1997	18.1	1.4	19.5
1998	18.4	1.4	19.8
1999	18.8	1.4	20.2
2000	19.2	1.4	20.6

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 25

INSTRUMENT OPERATIONS
AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE
(Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	
Historical*						
1980	10.6	4.1	19.3	4.1	38.2	(10.3)
1981	10.2	4.6	18.5	3.9	37.2	(9.6)
1982	9.5	4.6	13.9	3.6	31.7	(6.5)
1983	10.1	5.3	14.8	3.8	34.0	(7.0)
1984	11.3	6.0	16.0	4.0	37.3	(7.8)
1985	11.8	6.4	16.4	4.1	38.7	(8.0)
1986	12.8	6.6	16.8	4.3	40.5	(8.4)
1987	13.7	7.3	17.9	4.4	43.3	(9.2)
1988E	13.4	8.4	18.1	4.3	44.2	(9.5)
Forecast						
1989	13.9	8.9	18.7	4.3	45.8	(9.8)
1990	14.4	9.3	19.7	4.3	47.7	(10.5)
1991	14.9	9.8	20.5	4.3	49.5	(10.7)
1992	15.3	10.3	21.4	4.3	51.3	(11.0)
1993	15.7	10.7	21.8	4.3	52.5	(11.0)
1994	16.1	11.0	22.4	4.3	53.8	(11.0)
1995	16.5	11.3	23.0	4.3	55.1	(11.0)
1996	16.8	11.6	23.6	4.3	56.3	(11.0)
1997	17.2	11.8	24.1	4.3	57.4	(11.0)
1998	17.5	12.1	24.6	4.3	58.5	(11.0)
1999	17.8	12.4	25.2	4.3	59.7	(11.0)
2000	18.2	12.7	25.8	4.3	61.0	(11.0)

* Source: FAA Air Traffic Activity.

Notes: Non-IFR instrument counts at Terminal Control Area (TCA) facilities and expanded area radar service are included in the totals and noted in parenthesis as an information item (see Table 24).
The data include instrument operations at FAA operated military radar approach control facilities. Detail may not add to total because of independent rounding.

TABLE 26

NON-IFR INSTRUMENT OPERATIONS
(Millions)

FISCAL YEAR	TERMINAL CONTROL AREAS	AIRPORT RADAR SERVICE AREAS	TOTAL
Historical*			
1980	2.7	7.6	10.3
1981	2.8	6.8	9.6
1982	1.9	4.6	6.5
1983	2.3	4.7	7.0
1984	2.4	5.4	7.8
1985	2.0	6.0	8.0
1986	1.7	6.7	8.4
1987	1.7	7.5	9.2
1988E	1.7	7.8	9.5
Forecast			
1989	1.8	8.0	9.8
1990	2.5	8.0	10.5
1991	2.5	8.2	10.7
1992	2.5	8.5	11.0
1993	2.5	8.5	11.0
1994	2.5	8.5	11.0
1995	2.5	8.5	11.0
1996	2.5	8.5	11.0
1997	2.5	8.5	11.0
1998	2.5	8.5	11.0
1999	2.5	8.5	11.0
2000	2.5	8.5	11.0

* Source: FAA

Notes: 1982-1983 operations reflect the temporary termination of Stage III Service at 34 locations.

TABLE 27

IFR AIRCRAFT HANDLED
AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS
(Millions)

FISCAL YEAR	IFR AIRCRAFT HANDLED				
	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1980	13.9	2.6	8.9	4.7	30.1
1981	13.0	2.9	9.0	4.7	29.5
1982	12.7	3.3	7.5	4.3	27.9
1983	13.3	3.7	7.8	4.6	29.4
1984	14.1	4.4	8.3	4.9	31.6
1985	14.6	4.8	8.3	5.0	32.7
1986	16.0	5.0	8.1	5.1	34.2
1987	17.1	5.3	8.1	5.3	35.8
1988E	17.8	5.8	8.0	4.6	36.2
Forecast					
1989	18.4	6.1	8.1	4.6	37.2
1990	18.9	6.4	8.3	4.6	38.2
1991	19.6	6.8	8.7	4.6	39.7
1992	20.1	7.2	8.9	4.6	40.8
1993	20.5	7.4	9.1	4.6	41.6
1994	21.0	7.6	9.3	4.6	42.5
1995	21.5	7.9	9.5	4.6	43.5
1996	22.0	8.1	9.7	4.6	44.4
1997	22.4	8.3	9.8	4.6	45.1
1998	22.9	8.6	10.0	4.6	46.1
1999	23.4	8.8	10.2	4.6	47.0
2000	23.8	9.0	10.4	4.6	47.8

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 28

IFR DEPARTURES AND OVERS
AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS
(Millions)

FISCAL YEAR	AIR CARRIER IFR DEPARTURES	AIR CARRIER OVERS	AIR TAXI/COMMUTER IFR DEPARTURES	AIR TAXI/COMMUTER OVERS	GENERAL AVIATION IFR DEPARTURES	GENERAL AVIATION OVERS	MILITARY IFR DEPARTURES	MILITARY OVERS	TOTAL DEPARTURES	TOTAL OVERS
Historical*										
1980	4.9	4.0	1.2	0.1	3.9	1.2	1.7	1.4	11.7	6.7
1981	4.6	3.8	1.4	0.1	3.9	1.2	1.6	1.4	11.5	6.5
1982	4.4	3.8	1.6	0.2	3.2	1.2	1.5	1.3	10.7	6.4
1983	4.7	4.0	1.7	0.2	3.3	1.2	1.6	1.4	11.3	6.8
1984	5.0	4.1	2.0	0.3	3.5	1.3	1.7	1.4	12.3	7.0
1985	5.2	4.1	2.2	0.3	3.5	1.3	1.8	1.4	12.8	7.1
1986	5.7	4.6	2.3	0.4	3.4	1.3	1.8	1.5	13.2	7.7
1987	6.0	4.9	2.5	0.4	3.4	1.3	1.9	1.5	13.8	8.1
1988E	6.1	5.6	2.7	0.3	3.3	1.3	1.6	1.5	13.7	8.7
Forecast										
1989	6.3	5.8	2.9	0.3	3.4	1.3	1.6	1.4	14.2	8.8
1990	6.5	5.9	3.0	0.4	3.5	1.3	1.6	1.4	14.6	9.0
1991	6.8	6.0	3.2	0.4	3.7	1.3	1.6	1.4	15.3	9.1
1992	7.0	6.1	3.4	0.4	3.8	1.3	1.6	1.4	15.8	9.2
1993	7.2	6.1	3.5	0.4	3.9	1.3	1.6	1.4	16.2	9.2
1994	7.4	6.2	3.6	0.4	4.0	1.3	1.6	1.4	16.6	9.3
1995	7.6	6.3	3.7	0.5	4.1	1.3	1.6	1.4	17.0	9.5
1996	7.8	6.4	3.8	0.5	4.2	1.3	1.6	1.4	17.4	9.6
1997	8.0	6.4	3.9	0.5	4.2	1.4	1.6	1.4	17.7	9.7
1998	8.2	6.5	4.0	0.6	4.3	1.4	1.6	1.4	18.1	9.9
1999	8.4	6.6	4.1	0.6	4.4	1.4	1.6	1.4	18.5	10.0
2000	8.6	6.6	4.2	0.6	4.5	1.4	1.6	1.4	18.9	10.0

* Source: FAA Air Traffic Activity.

TABLE 29

TOTAL FLIGHT SERVICES
AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS
(Millions)

FISCAL YEAR	FLIGHT PLANS ORIGINATED	PILOT BRIEFS	AIRCRAFT CONTACTED	TOTAL FLIGHT SERVICES
Historical*				
1980	9.0	18.3	9.6	64.2
1981	8.8	17.7	9.6	62.6
1982	8.5	17.8	9.7	62.4
1983	8.1	16.0	8.6	56.9
1984	8.2	15.1	8.1	54.7
1985	8.0	14.6	7.7	52.9
1986	7.5	13.4	7.2	49.0
1987	7.6	12.8	7.0	47.7
1988E	7.5	11.6	6.4	44.7
Forecast				
1989	7.6	11.3	6.2	44.0
1990	7.8	11.2	6.2	44.2
1991	8.0	11.3	6.2	44.8
1992	8.1	11.3	6.2	45.0
1993	8.3	11.4	6.2	45.6
1994	8.4	11.5	6.2	46.0
1995	8.5	11.6	6.2	46.4
1996	8.7	11.7	6.2	47.0
1997	8.8	11.7	6.2	47.2
1998	8.9	11.8	6.2	47.6
1999	9.1	11.8	6.2	48.0
2000	9.2	11.8	6.2	48.2

* Source: FAA Air Traffic Activity.

Notes: Total flight services is equal to the sum of flight plans originated and pilot briefs, multiplied by two, plus the number of aircraft contacted.

TABLE 30

FLIGHT PLANS ORIGINATED
AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS
(Millions)

	FLIGHT PLANS ORIGINATED		
FISCAL YEAR	IFR-DVFR	VFR	TOTAL
Historical*			
1980	6.6	2.4	9.0
1981	6.5	2.3	8.8
1982	6.5	2.0	8.5
1983	6.3	1.9	8.1
1984	6.4	1.8	8.2
1985	6.3	1.7	8.0
1986	5.9	1.6	7.5
1987	5.9	1.7	7.6
1988E	5.8	1.7	7.5
Forecast			
1989	5.9	1.7	7.6
1990	6.0	1.8	7.8
1991	6.1	1.9	8.0
1992	6.2	1.9	8.1
1993	6.3	2.0	8.3
1994	6.4	2.0	8.4
1995	6.5	2.0	8.5
1996	6.6	2.1	8.7
1997	6.7	2.1	8.8
1998	6.8	2.1	8.9
1999	6.9	2.2	9.1
2000	7.0	2.2	9.2

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 31

AIRCRAFT CONTACTED
AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS
(Millions)

	USER CATEGORY				FLIGHT RULES		
FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	IFR-DVFR	VFR	TOTAL
Historical*							
1980	0.4	0.9	7.9	0.4	2.0	7.7	9.6
1981	0.4	0.9	7.9	0.4	2.0	7.6	9.6
1982	0.4	1.2	7.7	0.4	2.5	7.2	9.7
1983	0.4	1.1	6.6	0.4	2.3	6.3	8.6
1984	0.4	1.1	6.3	0.4	2.3	5.9	8.1
1985	0.4	1.1	5.8	0.4	2.2	5.5	7.7
1986	0.4	1.0	5.4	0.4	2.1	5.1	7.2
1987	0.4	1.0	5.2	0.4	2.1	4.9	7.0
1988E	0.3	0.9	4.8	0.4	1.9	4.5	6.4
Forecast							
1989	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1990	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1991	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1992	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1993	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1994	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1995	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1996	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1997	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1998	0.3	0.9	4.6	0.4	1.8	4.4	6.2
1999	0.3	0.9	4.6	0.4	1.8	4.4	6.2
2000	0.3	0.9	4.6	0.4	1.8	4.4	6.2

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 32

ACTIVE U.S. MILITARY AIRCRAFT
IN THE CONTINENTAL UNITED STATES (1)

	FIXED WING AIRCRAFT				
FISCAL YEAR	JET	TURBOPROP	PISTON	HELICOPTER	TOTAL
Historical*					
1980	8,794	1,869	699	7,607	18,969
1981	9,111	1,943	591	7,718	19,363
1982	9,647	1,900	516	9,665	21,728
1983	9,495	1,745	363	7,049	18,652
1984	9,551	1,777	333	7,172	18,833
1985	9,640	1,881	408	7,404	19,333
1986	9,730	1,803	386	8,238	20,157
1987	9,819	1,865	370	8,460	20,514
1988E	9,899	1,890	360	8,580	20,729
Forecast					
1989	9,905	1,910	358	8,798	20,971
1990	9,959	1,925	350	8,875	21,109
1991	9,965	1,930	350	9,011	21,256
1992	10,060	1,935	345	9,090	21,430
1993	10,121	1,948	345	9,150	21,564
1994	10,250	1,962	340	9,203	21,755
1995	10,313	1,968	340	9,240	21,861
1996(2)	10,313	1,968	340	9,240	21,861
1997	10,313	1,968	340	9,240	21,861
1998	10,313	1,968	340	9,240	21,861
1999	10,313	1,968	340	9,240	21,861
2000	10,313	1,968	340	9,240	21,861

* Source: Office of the Secretary of Defense, Department of Defense.

(1) Includes Army, Air Force, Navy and Marine regular service aircraft, as well as Reserve and National Guard aircraft.

(2) Detail planning information not available beyond 1995. Fiscal Years 1996-2000 projected at 1995 level.

TABLE 33

ACTIVE U.S. MILITARY AIRCRAFT
HOURS FLOWN IN THE CONTINENTAL UNITED STATES (1)
(Thousands)

	FIXED WING AIRCRAFT				
FISCAL YEAR	JET	TURBOPROP	PISTON	HELICOPTER	TOTAL
Historical*					
1980	2,904	796	235	1,320	5,255
1981	2,966	840	253	1,791	5,850
1982	3,347	762	192	1,876	6,177
1983	3,345	746	119	1,557	5,767
1984	3,389	761	120	1,605	5,875
1985	3,350	739	126	1,567	5,782
1986	3,510	820	155	1,798	6,283
1987	3,268	753	140	1,879	6,040
1988E	3,215	751	140	1,879	5,985
Forecast					
1989	3,215	768	137	1,898	6,018
1990	3,235	773	137	1,902	6,047
1991	3,265	780	137	1,993	6,175
1992	3,350	790	137	2,030	6,307
1993	3,415	793	137	2,105	6,450
1994	3,830	810	137	2,140	6,917
1995	3,895	810	137	2,140	6,982
1996(2)	3,895	810	137	2,140	6,982
1997	3,895	810	137	2,140	6,982
1998	3,895	810	137	2,140	6,982
1999	3,895	810	137	2,140	6,982
2000	3,895	810	137	2,140	6,982

* Source: Office of the Secretary of Defense, Department of Defense.

(1) Includes Army, Air Force, Navy and Marine regular service aircraft, as well as Reserve and National Guard aircraft.

(2) Detail planning information not available beyond 1995. Fiscal Years 1996-2000 projected at 1995 level.

GLOSSARY OF TERMS

Air Carrier Operations -- Arrivals and departures of air carriers certificated in accordance with FAR Parts 121 and 127.

Air Route Traffic Control Center (ARTCC) -- A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft.

Air Taxi -- An air carrier certificated in accordance with FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

Air Traffic -- Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

Air Traffic Hub -- Cities and Metropolitan Statistical Areas requiring aviation services. May include more than one airport. Communities fall into four classes as determined by the community's percentage of the total enplaned passengers by scheduled air carriers in the 50 United States, the District of Columbia, and other U.S. areas designated by the Federal Aviation Administration:

1. Large: 1.00 percent (4,268,161 passengers and over in CY 1987).
2. Medium: 0.25 percent to 0.999 percent (between 1,067,041 and 4,268,160 passengers in CY 1987).
3. Small: 0.05 percent to 0.249 percent (between 213,408 and 1,067,040 passengers in CY 1987).
4. Nonhub: Less than 0.05 percent (fewer than 213,408 passengers in CY 1987).

Air Travel Club -- An operator certificated in accordance with FAR Part 123 to engage in the carriage of members who qualify for that carriage by payment of an assessment, dues, membership fees, or other similar remittance.

Aircraft Contacted -- Aircraft with which the flight service stations have established radio communications contact. One count is made for each en route landing or departing aircraft contacted by a flight service station, regardless of the number of contacts made with an individual aircraft during the same flight. A flight contacting five FSS's would be counted as five aircraft contacted.

Aircraft Handled -- See IFR AIRCRAFT HANDLED.

Aircraft Operations -- The airborne movement of aircraft in controlled or noncontrolled airport terminal areas, and counts at en route fixes or other points where counts can be made. There are two types of operations: local and itinerant.

1. LOCAL OPERATIONS are performed by aircraft that:

   (a) operate in the local traffic pattern or within sight of the airport;

   (b) are known to be departing for or arriving from flights in local practice areas located within a 20-mile radius of the airport;

   (c) execute simulated instrument approaches or low passes at the airport.

2. ITINERANT OPERATIONS are all aircraft operations other than local operations.

Airport Advisory Service -- A service provided by flight service stations at airports not served by a control tower. This service provides information to arriving and departing aircraft concerning wind direction/speed, favored runway, altimeter setting, pertinent-known traffic/field conditions, airport taxi routes/traffic patterns, and authorized instrument approach procedures. This information is advisory and does not constitute an ATC clearance.

Airport Traffic Control Tower -- A terminal facility that through the use of air/ground communications, visual signaling, and other devices, provides ATC services to airborne aircraft operating in the vicinity of an airport and to aircraft operating on the movement area.

All-Cargo Carrier -- An air carrier certificated in accordance with FAR Part 121 to provide scheduled air freight, express, and mail transportation over specified routes, as well as to conduct nonscheduled operations that may include passengers.

Approach Control Facility -- A terminal air traffic control facility providing approach control service.

Approach Control Service -- Air traffic control service provided by an approach control facility for arriving and departing VFR/IFR aircraft and, on occasion, for enroute aircraft. At some airports not served by an approach control facility, the ARTCC provides limited approach control service.

ARTCC -- See AIR ROUTE TRAFFIC CONTROL CENTER.

ASM's -- See AVAILABLE SEAT MILES.

Available Seat Miles (ASM's) -- The aircraft miles flown in a flight stage, multiplied by the number of seats available on that stage for revenue passenger use.

Business Transportation -- Any use of an aircraft, not for compensation or hire, by an individual for transportation required by the business in which the individual is engaged.

Center -- See AIR ROUTE TRAFFIC CONTROL CENTER.

Center Area -- The specified airspace within which an Air Route Traffic Control Center (ARTCC) provides air traffic control and advisory service.

Center Radar Approach Control (CERAP) -- A combined Air Route Traffic Control Center (ARTCC) and a Terminal Radar Approach Control facility (TRACON).

CERAP -- See CENTER RADAR APPROACH CONTROL.

Commercial Air Carriers -- An air carrier certificated in accordance with FAR Part 121 or 127 to conduct scheduled services on specified routes. These air carriers may also provide nonscheduled or charter services as a secondary operation. Four carrier groupings have been designated for statistical and financial data aggregation and analysis.

Commercial Air Carriers (Continued)

1. MAJORS: Air carriers with annual operating revenues greater than $1 billion.

2. NATIONALS: Air carriers with annual operating revenues between $100 million, and $1 billion.

3. LARGE REGIONALS: Air carriers with annual operating revenues between $10 million and $99,999,999.

4. MEDIUM REGIONALS: Air carriers with annual operating revenues less than $10 million.

Common IFR Room -- A highly automated terminal radar control facility. It provides terminal radar service in an area encompassing more than one major airport that accommodates instrument flight operations.

Commuter Air Carrier -- An air carrier certificated in accordance with FAR Part 135 that operates aircraft with a maximum of 60 seats, and that provides at least five scheduled round trips per week between two or more points, or that carries mail.

Commuter/Air Taxi Operations -- Arrivals and departures of air carriers certificated in accordance with FAR Part 135.

Control Tower -- See AIRPORT TRAFFIC CONTROL TOWER.

Domestic Operations -- All air carrier operations having destinations within the 50 United States, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

Executive Transportation -- Any use of an aircraft, not for compensation or hire, by a corporation, company or other organization for the purpose of transporting its employees and/or property, and employing professional pilots for the operation of the aircraft.

FAA -- Federal Aviation Administration.

Facility -- See AIR TRAFFIC CONTROL TOWER.

Flight Plan -- Prescribed information relating to the intended flight of an aircraft that is filed orally or in writing with a flight service station or an air traffic control facility.

Flight Service Station (FSS) -- Air Traffic Service facilities within the National Airspace System that provide preflight pilot briefings and en route communications with IFR flights; assist lost IFR/VFR aircraft; assist aircraft having emergencies; relay ATC clearances, originate, classify, and disseminate Notices to Airmen (NOTAM's); broadcast aviation weather and NAS information; receive and close flight plans; monitor radio NAVAIDS; notify search and rescue units of missing VFR aircraft; and operate the national weather teletypewriter systems. In addition, at selected locations, FSS's take weather observations, issue airport advisories, administer airmen written examinations, and advise Customs and Immigration of transborder flights.

Flight Services -- See TOTAL FLIGHT SERVICES.

Foreign Flag Air Carrier -- An air carrier other than a U.S. flag air carrier in international air transportation. "Foreign air carrier" is a more inclusive term than "foreign flag air carrier," including those non-U.S. air carriers operating solely within their own domestic boundaries. In practice, the two terms are used interchangeably.

FSS -- See FLIGHT SERVICE STATION.

General Aviation -- All civil aviation activity except that of air carriers certificated in accordance with FAR Parts 121, 123, 127, and 135. The types of aircraft used in general aviation (GA) activities cover a wide spectrum from corporate multi-engine jet aircraft piloted by professional crews to amateur-built single engine piston acrobatic planes, balloons, and dirigibles.

General Aviation Operations -- Arrivals and departures of all civil aircraft, except those classified as air carrier and commuter/air taxi.

Hub -- See AIR TRAFFIC HUB.

IFR -- See INSTRUMENT FLIGHT RULES.

IFR Aircraft Handled -- The number of IFR departures multiplied by two, plus the number of IFR overs. This definition assumes that the number of departures (acceptances, extensions, and originations of IFR flight plans) is equal to the number of landings (IFR flight plans closed).

IFR Departures -- An IFR departure includes IFR flights that:

1. originate in a Center's area;

2. are extended by the Center; or

3. are accepted by the Center under sole enroute clearance procedures.

IFR Overs -- An IFR flight that originates outside the ARTCC area and passes through the area without landing.

IFSS -- See INTERNATIONAL FLIGHT SERVICE STATION.

International and Territorial Operations -- The operation of aircraft flying between the 50 United States and foreign points, between the 50 United States and U.S. possessions and territories, and between two foreign points. Includes both the combination passenger/cargo and the all-cargo carriers engaged in international and territorial operations.

Instructional Flying -- Any use of aircraft for the purpose of formal instruction with the flight instructor aboard, or with the maneuvers on the particular flight(s) specified by the flight instructor.

Instrument Approach -- A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually. An instrument approach is prescribed and approved for a specific airport by competent authority (FAR Part 91).

Instrument Flight Rules (IFR) -- Rules governing the procedures for conducting instrument flight.

Instrument Operation -- An aircraft operation in accordance with an IFR flight plan or an operation where IFR separation between aircraft is provided by a terminal control facility or air route traffic control center.

International Flight Service Station (IFSS) -- A central operations facility in the flight advisory system, manned and equipped to control aeronautical point-to-point telecommunications and air/ground telecommunications with pilots operating over international territory or waters, providing flight plan filing, weather information, search and rescue action, and other flight assistance operations.

Itinerant Operations -- See AIRCRAFT OPERATIONS.

Large Regionals -- See COMMERCIAL AIR CARRIERS.

Local Operations -- See AIRCRAFT OPERATIONS.

Majors -- See COMMERCIAL AIR CARRIERS.

Medium Regionals -- See COMMERCIAL AIR CARRIERS.

Military Operations -- Arrivals and departures of aircraft not classified as civil.

Nationals -- See COMMERCIAL AIR CARRIERS.

Personal/Pleasure Flying -- Any use of an aircraft for personal purposes not associated with a business or profession, and not for hire. This includes maintenance of pilot proficiency.

Pilot Briefing -- A service provided by the flight service station to assist pilots in flight planning. Briefing items may include weather information, NOTAM's, military activities, flow control information, and other items as requested.

Radar Air Traffic Control Facility (RATCF) -- An air traffic control facility, located at a U.S. Navy (USN) or Marine Corps (USMC) Air Station, utilizing surveillance and, normally, precision approach radar and air/ground communication equipment to provide approach control services to aircraft arriving, departing, and transiting the airspace controlled by the facility. The facility may be operated by the FAA, the USN and the FAA, the USN, or the USMC. Service may be provided to both civil and military airports.

Radar Approach Control (RAPCON) -- An air traffic control facility, located at a U.S. Air Force (USAF) Base, utilizing surveillance and, normally, precision approach radar and air/ground communication equipment to provide approach control services to aircraft arriving, departing, and transiting the airspace controlled by the facility. The facility may be operated by the FAA, or the USAF. Service may be provided to both civil and military airports.

Radio Contacts -- The initial radio call-up to a flight service station by enroute aircraft; a complete interchange of information and a termination of the contact.

RAPCON -- See RADAR APPROACH CONTROL.

RATCF -- See RADAR AIR TRAFFIC CONTROL FACILITY.

Registered Active General Aviation Aircraft -- A civil aircraft registered with the FAA that has been flown one or more hours during the previous calendar year. Excludes are aircraft owned and operated in regularly scheduled, nonscheduled, or charter service by commercial air carriers and aircraft in excess of 12,500 pounds maximum gross takeoff weight, and owned and operated by a commercial operator certificated by the FAA to engage in intrastate common carriage.

Research and Special Programs Administration (RSPA) -- The Research and Special Programs Administration of the U.S. Department of Transportation. Responsible for the collection of air carrier traffic and financial data on Form 41 that was collected formerly by the Civil Aeronautics Board.

Revenue Passenger Enplanements -- The total number of passengers boarding aircraft. Includes both originating and connecting passengers.

Revenue Passenger Load Factor -- Revenue passenger-miles as a percent of available seat-miles in revenue passenger services, i.e., the proportion of aircraft seating capacity that is actually sold and utilized.

Revenue Passenger Mile (RPM) -- One revenue passenger transported one mile in revenue service. Revenue passenger miles are computed by summation of the products of the revenue aircraft miles flown a flight stage, multiplied by the number of revenue passengers carried on that flight stage.

Revenue Ton Mile (RTM) -- One ton of revenue traffic transported one mile.

RPM -- See REVENUE PASSENGER MILE.

RSPA -- See Research and Special Program Administration

RTM -- See REVENUE TON MILE.

Secondary Airport -- An airport receiving approach control service as a satellite to a primary approach control facility, or one at which control is exercised by the approach control facility under tower en route control procedure.

Supplemental Air Carrier -- An air carrier certificated in accordance with FAR Part 121, and providing nonscheduled or supplemental carriage of passengers or cargo, or both, in air transportation. Also referred to as nonscheduled or charter air carriers.

Terminal Radar Approach Control (TRACON) -- An FAA traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service may be provided to both civil and military airports. A TRACON is similar to a RAPCON (USAF), RATCF (USN), and ARAC (Army).

Total Flight Services -- The sum of flight plans originated and pilot briefs, multiplied by two, plus the number of aircraft contacted. No credit is allowed for airport advisories.

Total Operations -- All arrivals and departures performed by military, general aviation, commuter/air taxi, and air carrier aircraft.

Tower -- See AIRPORT TRAFFIC CONTROL TOWER.

TRACON -- See TERMINAL RADAR APPROACH CONTROL.

U.S. Flag Carrier -- Air carrier holding a certificate issued by the Department of Transportation, and approved by the President, authorizing the carrier to provide scheduled operations over a specified route between the United States (and/or its territories) and one or more foreign countries.

VFR -- See VISUAL FLIGHT RULES.

VFR Tower -- An airport traffic control tower that does not provide approach control service.

Visual Flight Rules (VFR) -- Rules that govern the procedures for conducting flight under visual conditions. Also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. Used by pilots and controllers to indicate type of flight plan.

APPENDIX A

ACTIVE U. S. COMMERCIAL AIR CARRIERS

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
1. Aerial (AG)	F	MR	12-84	8-84
2. Aeron	F	MR		4-83
3. Air Wisconsin (ZW)	S	N	7-79	
4. Alaska (AS) (4)	S	N	X	
5. Aloha (AQ) (5)	S	N	X	6-84
6. American (AA) (6)	S	M	X	X
7. Amerijet	C	MR	10-87	10-87
8. America West (HP)	S	N	8-83	
9. American Trans Air	S	N	X	X
10. Arrow (JW)	S	LR	11-82	6-83
11. Aspen (AP) (7)	S	LR	1-85	
12. Braniff (BN) (8)	S	N	3-84	
13. Buffalo	C	LR	4-84	4-84
14. Challenge Air Cargo	F	MR		7-86
15. Connor	F	MR	1-87	1-87
16. Continental (CO) (9)	S	M	X	X
17. Delta (DL) (10)	S	M	X	X
18. Eastern (EA)	S	M	X	X
19. Emerald (OD)	S	LR	7-82	
20. Evergreen (JO)	F	LR	X	X
21. Express One	F			
22. Federal Express (FM)	F	M	1-86	1-86
23. Florida Express (ZO)	S	LR	1-84	1-87
24. Florida West	F	MR	3-88	1-87
25. Flying Tiger (FT)	F	M	X	X
26. Great American (FD)	C	MR	10-80	
27. Gulf Air Transport (GA)	C	MR		1-85
28. Hawaiian (HA)	S	N	X	10-84
29. Horizon Air (QX)	S	LR	9-84	
30. Independent Air	S	MR	9-94	9-84

ACTIVE U. S. COMMERCIAL AIR CARRIERS (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
31. International Air Service	C	LR	7-88	
32. Jet Fleet (JL)	C	MR	6-83	
33. Key	C	LR	6-84	1-85
34. Markair (BF) (11)	S	LR	X	
35. Midway (ML)	S	N	11-79	
36. Midwest Express (YX)	S	LR	7-84	
37. Million	C	MR	10-87	1-86
38. MGM Grand (MG)	S	N	9-87	
39. Northern Air Cargo (HU)	F	LR	12-82	
40. Northwest (NW) (12)	S	M	X	X
41. Orion	F	MR	1-87	1-87
42. Pacific Interstate (QT)	S	LR	12-84	
43. Pan American (PA)	S	M	X	X
44. Piedmont (PI) (13)	S	M	X	
45. Presidential (XV)	S	LR	10-85	
46. Reeve (RV)	S	LR	X	
47. Rich (XR)	C	MR	1-82	
48. Rosenbalm	F	MR	4-85	4-85
49. Royal West	S	LR	7-86	
50. Sky World	C	LR	10-85	10-85
51. Southern Air	F	LR	5-80	4-80
52. Southwest (WN)	S	N	2-79	
53. Sun Country (SC)	C	MR	1-83	3-83
54. Sunworld (JK)	S	LR	5-83	
55. Tower (FF)	S	LR		11-83
56. Trans Air-Link	F	MR	1-84	1-84
57. Trans International	F	MR	5-85	1-85
58. Trans World (TW) (14)	S	M	X	X
59. Trump Air Shuttle	S	M	12-88	
60. United (UA)	S	M	X	4-83

ACTIVE U. S. COMMERCIAL AIR CARRIERS (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
61. USAir (AL) (15)	S	M	X	
62. West Air	S	LR	4-88	
63. Zantop	F	LR	X	X

(1) S = Scheduled; C = Charter; F = All-Cargo.

(2) M = Majors; N = Nationals; LR = Large Regionals; MR = Medium Regionals.

(3) Date of first reported traffic is indicated for those carriers starting service since the passage of the Airline Deregulation Act of 1978. Traffic reported by those carriers certificated prior to deregulation indicated by an X.

(4) Acquired Jet America.

(5) Discontinued international service 1/85.

(6) Acquired AirCal.

(7) Carrier reported as a commuter air carrier from 9/82 to 12/84.

(8) Carrier did not operate from 5/82 to 2/84.

(9) Acquired Frontier, New York Air and People Express.

(10) Acquired Western Airlines.

(11) Formerly Alaska International.

(12) Acquired Republic Airlines.

(13) Acquired Empire Airlines.

(14) Acquired Ozark Airlines.

(15) Acquired Pacific Southwest

APPENDIX B

CARRIERS NO LONGER INCLUDED IN AIR CARRIER DATA BASE

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
1. Aeromech (KC)	S	MR	7-79		5-81**
2. Air Atlanta (CC)	S	LR	2-84		7-86*
3. AirCal (OC)	S	N	1-79		3-87m
4. Air Florida (QH)	S	N	1-79	7-80	5-84*
5. Air Illinois (UX)	S	LR	1-83		2-84*
6. Airlift (RD)	C	MR	7-84	7-84	12-85*
7. Airmark	C	MR	8-84	9-84	12-84*
8. Air Midwest (ZV)	S	LR	X		12-84**
9. Air National (AH)	C	LR		4-84	6-84*
10. Air Nevada (LW)	S	MR	4-81		7-82**
11. Air New England (NE)	S	MR	X		10-81*
12. Air North (NO)	S	MR	6-80		8-82**
13. Air North/Nenana (XG)	S	MR	3-81		8-82**
14. Air One (CB)	S	LR	4-83		7-84*
15. AirPac (RI)	S	LR	4-84		12-85*
16. All Star (LS)	S	MR	4-83	4-83	10-85*
17. Altair (AK)	S	MR	1-79		9-82*
18. American Int'l. (AV)	S	LR	11-82		9-84*
19. Apollo (ID)	S	MR	5-79		7-81**
20. Arista (RI)	C	MR	12-82	8-82	3-84*
21. Atlantic Gulf (ZY)	C	MR	9-85		7-86*
22. Best (IW)	S	MR	7-82		10-85**
23. Big Sky (GQ)	S	MR	6-79		9-82**
24. Blue Bell (BB)	C	MR	6-83		2-84*
25. Britt (RU)	S	LR	10-84		6-87**

CARRIERS NO LONGER INCLUDED IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
26. Cascade (CZ)	S	LR	1-85		11-85*
27. Capitol (CL)	S	N	7-80	7-81	9-84*
28. Challenge (CN)	F	MR		8-82	6-86*
29. Challenge Air Int'l.	S	MR		7-86	8-87*
30. Cochise (DP)	S	MR	1-79		12-81*
31. Coleman (CH)	S	MR	9-79		3-80*
32. Colgan (CJ)	S	MR	4-81		3-83**
33. Empire (UR)	S	LR	10-79		4-86m
34. Five Star	C	LR	12-85		5-88*
35. Flight International	C	MR	4-84	6-84	9-85*
36. Frontier (FL)	S	N	X	X	8-86m
37. Frontier Horizon (FH)	S	LR	1-84		1-85*
38. Galaxy (GY)	C	MR	10-83	12-83	5-87*
39. Global (GL)	C	LR	X	X	12-84*
40. Golden Gate (GG)	S	MR	5-80		7-81*
41. Golden West (GW)	S	MR	2-79		7-82**
42. Guy America (HX)	S	MR		8-81	2-83*
43. Hawaii Express (LP)	S	LR	10-82		10-83*
44. Imperial (II)	S	MR	1-80		6-82**
45. Int'l. Air Service (IE)	C	LR	11-83		5-85*
46. Interstate	F	LR	5-85	5-85	10-87*
47. Jet America (SI)	S	N	1-82		8-87m
48. Jet Charter	C	MR	7-82	7-82	5-85*
49. Kodiak (KO)	S	MR	X		11-82**
50. L.A.B. (JF)	S	MR	1-82		8-82**
51. McClain (MU)	S	LR	11-86		2-87**
52. Mid-South (VL)	S	MR	6-80		2-84*
53. Midstate (IU)	S	MR	7-81		7-82**
54. Mid Pacific (HO)	S	LR	10-85		9-87*
55. Midway Express	S	LR	10-84		7-85*

CARRIERS NO LONGER INCLUDED IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
56. Mississippi Valley (XV)	S	MR	4-79		8-82**
57. Munz (XY)	S	MR	X		8-83*
58. New Air (NC)	S	MR	5-79		9-82**
59. New York Air (NY)	S	N	12-80		12-86m
60. New Wien (WC)	S	MR	9-85		10-85*
61. Northeastern (QS)	S	LR	7-84		2-85*
62. Overseas (OV)	C	LR	10-82		10-85*
63. Ozark (OZ)	S	N	X		9-86m
64. Pacific East (PR)	S	LR	9-82		3-84*
65. Pacific Express (VB)	S	LR	2-82		10-83*
66. Pacific Southwest (PS)	S	N	1-79		4-88m
67. Peninsula (KS)	S	MR	1-82		1-83**
68. People Express (PE)	S	N	5-81	5-83	12-86m
69. Pilgrim (PM)	S	LR	9-85		12-86*
70. Ports of Call Travel Club	C	LR	9-85		1-86*
71. Pride Air (NI)	S	LR	10-85		11-85*
72. Republic (RC)	S	M	X		9-86m
73. Rocky Mountain (JC)	S	MR	7-81		9-82**
74. Royale (OQ)	S	LR	3-84		6-84**
75. Ryan	C	LR	4-84	4-84	5-86*
76. Sea Airmotive (KJ)	S	MR	1-80		6-82**
77. Sky Bus (FW)	S	MR	7-85		11-86*
78. Skystar	C	MR	1-85	3-85	1-87*
79. Sky West (QG)	S	MR	7-79		12-84**
80. Samoa (MB)	S	MR		2-85	6-85*
81. Southeast (NS)	S	MR	7-79		1-80*
82. South Pacific Island (HK)	S	LR		7-81	11-86*
83. Sun Coast (WS)	C	MR		5-87	9-87*
84. Swift Aire (WI)	S	MR	1-79		7-81*
85. T-Bird (DQ)	C	MR		4-82	8-84*

CARRIERS NO LONGER INCLUDED IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
86. Total Air (TA)	C	MR	10-84	5-85	1-87*
87. Transamerica (TV)	S	N		5-79	9-86*
88. Transtar (MA) (11)	S	LR	8-81		8-87m
89. Wien (WC)	S	N	X		11-84*
90. Western (WA)	S	M	X	X	3-87m
91. Western Yukon (WX)	S	MR	7-81		6-82*
92. World (WO)	C	N	7-80	5-81	9-86*
93. Worldwide	C	MR	10-84	10-84	3-86*
94. Wright (FW)	S	MR	X		11-82**

(1) S = Scheduled; C = Charter; F = All-Cargo.

(2) M = Majors; N = Nationals; LR = Large Regionals; MR = Medium Regionals.

(3) Date of first reported traffic is indicated for those carriers starting service since the passage of the Airline Deregulation Act of 1978. Traffic reported by those carriers certificated prior to deregulation indicated by an X.

(4) Date of last reported traffic is indicated. Carriers that have discontinued scheduled passenger service indicated by an *. Carriers now filing RSPA Form 298-C in lieu of RSPA Form 41 indicated by **. Carriers that have merged operations indicated by an m.

APPENDIX C

U.S. SCHEDULED AIR CARRIERS SCHEDULED TRAFFIC AND CAPACITY BY INTERNATIONAL TRAVEL REGION

ATLANTIC ROUTES

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	38,754	24,733	63.8	8,450
1981	38,039	25,328	66.6	8,427
1982	39,217	25,713	65.6	8,253
1983	39,656	27,209	68.6	8,793
1984	46,347	31,963	69.0	10,079
1985	53,918	36,098	66.9	11,368
1986	58,248	32,602	56.0	10,515
1987	58,953	38,497	65.3	12,397
1988E	70,123	46,144	65.8	14,588

LATIN AMERICA ROUTES

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	25,689	16,335	63.6	12,272
1981	20,719	12,306	59.4	9,411
1982	18,417	10,000	54.3	7,986
1983	17,965	9,974	55.5	8,168
1984	17,254	10,239	59.3	8,238
1985	16,012	9,658	60.3	7,891
1986	18,410	11,076	60.2	8,539
1987	21,908	12,992	59.3	10,377
1988E	22,748	14,212	62.5	11,475

U.S. SCHEDULED AIR CARRIERS

SCHEDULED TRAFFIC AND CAPACITY

BY INTERNATIONAL TRAVEL REGION (Continued)

PACIFIC ROUTES

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	22,328	13,134	58.8	3,366
1981	20,744	12,668	61.1	3,341
1982	21,703	13,331	61.4	3,440
1983	24,015	14,947	62.2	3,961
1984	26,689	17,499	65.6	4,645
1985	28,041	18,649	66.5	5,020
1986	31,482	20,276	64.4	5,406
1987	36,624	24,530	67.0	6,614
1988E	42,533	30.190	71.0	8,180

Source: RSPA Form 41

APPENDIX D

U.S. AIR CARRIERS
NONSCHEDULED TRAFFIC AND CAPACITY

DOMESTIC

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	4,600	3,497	76.0	2,378
1981	2,914	2,173	74.6	1.555
1982	3,007	2,160	71.8	1,641
1983	6,854	5,109	74.5	2,882
1984	8,142	6,078	74.6	3,840
1985	9,841	7,491	76.1	5,318
1986	8,404	6,345	75.5	4,856
1987	6,170	4,422	71.7	3,933
1988E	6,597	4,913	74.4	4,451

INTERNATIONAL

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	3,910	3,244	83.0	927
1981	3,391	2,922	86.2	904
1982	4,260	3,643	85.5	1,149
1983	9,443	8,045	85.2	3,034
1984	8,513	7,385	86.8	2,824
1985	8,637	7,438	86.1	2,857
1986	7,517	6,327	84.2	2,662
1987	10,510	8,626	82.1	3,708
1988E	11,014	9,073	82.4	3,875

U.S. AIR CARRIERS

NONSCHEDULED TRAFFIC AND CAPACITY (Continued)

	TOTAL			
FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	8,510	6,741	79.2	3,305
1981	6,305	5,095	80.8	2,459
1982	7,267	5,803	79.9	2,790
1983	16,297	13,154	80.7	5,916
1984	16,655	13,463	80.8	6,664
1985	18,478	14,929	80.8	8,175
1986	15,921	12,672	79.6	7,518
1987	16,680	13,048	78.2	7,641
1988E	17,611	13,986	79.4	8,326

Source: RSPA Form 41

APPENDIX E

U.S. AIR CARRIERS
CARGO REVENUE TON MILES
(In Millions)

FREIGHT/EXPRESS RTM'S

FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1980	3,419	2,893	6,312
1981	3,365	2,651	6,016
1982	3,144	2,792	5,936
1983	3,809	2,910	6,719
1984	4,391	3,328	7,719
1985	3,943	3,340	7,284
1986	4,869	3,988	8,857
1987	5,782	4,781	10,563
1988E	6,662	5,661	12,323

MAIL RTM'S

FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1980	922	390	1,312
1981	994	376	1,370
1982	999	392	1,391
1983	1,040	400	1,440
1984	1,145	441	1,586
1985	1,203	450	1,653
1986	1,233	438	1,671
1987	1,314	435	1,749
1988E	1,422	463	1,885

U.S. AIR CARRIERS

CARGO REVENUE TON MILES (Continued)
(In Millions)

	TOTAL RTM'S		
FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1980	4,341	3,283	7,624
1981	4,359	3,027	7,386
1982	4,143	3,184	7,327
1983	4,849	3,310	8,159
1984	5,536	3,769	9,305
1985	5,146	3,790	8,936
1986	6,102	4,426	10,528
1987	7,096	5,216	12,312
1988E	8,084	6,124	14,208

Source: RSPA Form 41

APPENDIX F

ACTIVE U.S. REGIONALS/COMMUTERS

1. Action Airlines
2. Aero Coach
3. Air Cape
4. Air Caribe International
5. Air Kentucky (2)
6. Air LA
7. Air Link
8. Air Midwest
9. Air Nevada
10. Air New Orleans
11. Air Sunshine
12. Airways International
13. Alaska Island Air (1)
14. Aleutian Air Ltd. (1)
15. Alliance Airlines
16. Aloha Island Air (2)
17. Alpha Air
18. Alpine Air
19. Altus Airlines
20. ANA, Ltd. (2)
21. Armstrong Air Service
22. Aspen (2)
23. Atlantic Southeast Airlines (2)
24. Atlantis Airlines (2)
25. Audi Airlines
26. Bader Express
27. Baker Aviation
28. Bar Harbor Airlines (2)
29. Barrow Air (1)
30. BAS Beaver Aviation
31. Bellair (1)
32. Bemidji Airlines
33. Bering Air (1)
34. Big Island Air
35. Big Sky Airlines (2)
36. Britt Airways (2)
37. Brockway Air (2)
38. Business Express Airlines (2)
39. Cape Smythe Air Service (1)
40. Capitol Airlines (2)
41. Caribbean Express
42. Catskill Airways
43. CCAir (2)
44. Chalk's International Airlines
45. Channel Flying Service (1)
46. Chaparral Airlines (2)
47. Chartair (1)
48. Chautauqua Airlines (2)
49. Chester County Aviation
50. Chitna Air Service (1)
51. Christman Air System
52. Coastal Air Transport
53. Colgan (2)
54. Comair (2)
55. Command Airways (2)
56. Crown Airways (2)
57. Crown Air
58. Cumberland Airlines
59. Direct Air
60. East Hampton Aire

ACTIVE U.S. REGIONALS/COMMUTERS(Continued)

61. Eastern Metro Express (2)
62. Empire Airways
63. Enterprise Airlines
64. ERA Aviation (1)
65. Executive Air Charter (2)
66. Executive Express
67. Executive Express II
68. Express Airlines I
69. Flamenco Airways
70. Freedom Air
71. Friendship Air Alaska (1)
72. Frontier Flying Service (1)
73. Galena Air Service (1)
74. GCS Air Service
75. Golden Pacific Airlines
76. GP Express Airlines
77. Grand Canyon Helicopters
78. Great Lakes Aviation
79. Gulkana Air Service (1)
80. Haines Airways (1)
81. Harbor Air Service (1)
82. Harbor Airlines
83. Havasu Airlines
84. Helitrans
85. Henson Aviation
86. Hermens Air (1)
87. Holiday Airlines
88. Horizon Air (2)
89. Hub Express
90. Iliamna Air Taxi (1)
91. Iowa Airways (2)
92. Jetstream International (2)
93. Kenmore Air Harbor
94. Ketchikan Air Service (1)
95. King Flying Service (1)
96. LA Helicopters
97. L.A.B. Flying Service (1)
98. Larry's Flying Service (1)
99. Long Island Airlines
100. Loredo Air
101. Mall Airways
102. Manu'a Air Transport
103. Maui Airlines
104. Mesa Air Shuttle
105. Mesaba Airlines (2)
106. Metroflight Airlines (2)
107. Michigan Airways
108. Mid Pacific Airlines (2)
109. Midcontinent Airlines
110. Midstate Airlines
111. Midway Connection (2)
112. Midwest Aviation
113. MST Aviation
114. Nashville Eagle (2)
115. New England Airlines
116. New York Helicopter
117. North Pacific Airlines/NPA (2)
118. Olson Air Service (1)
119. Omniflight Helicopters
120. Pan Am Express (2)
121. Panorama Air Tours
122. Peninsula Airways (1)
123. Pennsylvania Airlines (2)
124. Pilgrim Aviation (2)
125. Pocono Airlines (2)
126. Precision Valley Aviation (2)
127. Prime Air
128. Pro Air Service
129. Propheter Aviation
130. Provincetown-Boston/PBA (2)
131. QWest Air
132. Resort Air
133. Resort Commuter
134. Resort International
135. Rocky Mountain Airways (2)
136. Ross Aviation
137. Royale Airlines (2)
138. Ryan Air Service (1)
139. San Juan Airlines (2)
140. Scenic Airlines

ACTIVE U.S. REGIONALS/COMMUTERS(Continued)

141. Seagull Air Service
142. SFO Helicopter Airlines
143. Simmons Airlines (2)
144. Skagway Air Service (1)
145. SkyWest Airlines (2)
146. South Pacific Island Airways
147. SouthCentral Air (1)
148. Southern Airways
149. Southern Jersey Airways
150. Stateswest Airlines
151. Suburban Airlines (2)
152. Sunaire (2)
153. Tanana Air Service (1)
154. Taquan Air Service (1)
155. Tatonduk Flying Service (1)
156. Temsco Airlines
157. Tennessee Airways
158. Texas National Airlines
159. Tropic Air/Air Molokai
160. Tropical Helicopter Airways
161. Valley Airlines
162. Vieques Air Link
163. Village Aviation (1)
164. Virgin Air
165. Virgin Islands Seaplane
166. Walker's International
167. Westair Airlines (2)
168. Wilbur's Inc. (1)
169. Wings Airways (PA)
170. Wings of Alaska (1)
171. Wings West Airlines (2)
172. WRA Inc. (1)
173. Wrangell Air Service (1)
174. Wright Air Service (1)
175. Yute Air Alaska (1)
176. 40-Mile Air (1)

(1) Alaskan commuter airlines - not included in regional/commuter forecast.

(2) Regional/commuter airlines having code-sharing agreements with a national or major airline.

APPENDIX G

GENERAL AVIATION AIRCRAFT COST INDICES

SINGLE ENGINE PISTON AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	93.7	86.4	98.2	95.0
1971	95.7	93.2	98.8	97.4
1972	100.0	100.0	100.0	100.0
1973	100.0	109.2	109.9	109.8
1974	100.0	129.6	148.8	143.6
1975	114.1	138.9	158.9	153.6
1976	132.4	169.1	173.1	172.1
1977	142.2	184.5	202.2	197.5
1978	149.9	192.0	230.9	220.5
1979	165.6	201.1	287.6	264.5
1980	173.8	214.8	364.6	324.5
1981	216.6	227.8	425.7	372.7
1982	245.3	256.2	443.7	393.6
1983	280.7	269.1	450.6	401.9
1984	304.3	279.6	446.1	401.5
1985	316.4	289.1	436.8	397.1
1986	338.4	294.6	411.9	380.4
1987	*	300.2	405.3	377.0
1988	*	307.7	405.3	378.9

* Not calculated because all models in index have stopped production.

Source: FAA-APO Estimates

MULTI-ENGINE PISTON AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	82.6	96.7	98.1	97.5
1971	90.5	99.9	98.8	99.2
1972	100.0	100.0	100.0	100.0
1973	100.0	109.0	109.9	109.5
1974	102.9	130.0	148.6	140.5
1975	117.5	150.0	158.8	154.9
1976	128.6	172.8	173.0	173.0
1977	137.6	187.8	202.0	196.8
1978	151.8	196.5	230.8	215.8
1979	168.9	207.1	287.3	252.1
1980	185.3	216.6	364.2	299.5
1981	211.3	226.5	425.3	338.1
1982	232.9	240.6	443.4	359.2
1983	248.0	250.4	450.2	362.6
1984	289.4	260.0	445.7	364.3
1985	327.5	268.8	436.7	363.1
1986	343.2	274.2	411.7	351.2
1987	341.0	279.4	405.0	349.8
1988	367.6	286.4	405.0	352.9

Source: FAA-APO Estimates

TURBOPROP AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	87.7	99.3	92.7	95.3
1971	93.9	103.1	97.9	99.9
1972	100.0	100.0	100.0	100.0
1973	100.0	108.9	118.8	114.8
1974	103.0	130.0	146.6	139.9
1975	113.8	144.4	156.8	151.7
1976	125.6	150.2	164.6	158.7
1977	125.6	144.1	181.9	166.6
1978	131.9	156.8	221.4	195.2
1979	145.0	160.7	296.9	241.8
1980	157.8	163.4	354.0	276.9
1981	182.7	169.6	403.8	309.0
1982	189.9	180.2	420.8	323.2
1983	204.3	187.5	434.7	334.6
1984	213.0	194.7	434.7	337.5
1985	236.2	201.3	429.9	335.4
1986	247.5	205.3	384.8	310.2
1987	251.8	209.2	384.8	311.8
1988	295.6	214.4	384.8	313.9

Source: FAA-APO Estimates

TURBOJET AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	87.0	94.6	92.6	93.3
1971	87.0	96.2	97.8	97.2
1972	100.0	100.0	100.0	100.0
1973	100.2	109.0	118.7	115.6
1974	104.7	130.0	127.4	128.2
1975	115.1	140.2	156.8	151.4
1976	123.4	153.5	164.6	160.9
1977	135.9	167.6	181.9	177.3
1978	151.5	174.3	221.4	206.2
1979	167.2	179.4	296.9	259.0
1980	205.7	182.7	353.9	298.7
1981	216.7	187.1	403.8	333.9
1982	240.4	198.7	420.8	348.9
1983	251.8	206.7	434.7	361.2
1984	266.2	214.7	434.7	363.7
1985	278.4	221.3	429.9	362.8
1986	299.0	225.7	384.8	333.8
1987	309.3	230.0	384.8	335.1
1988	328.2	235.7	384.8	337.2

Source: FAA-APO Estimates

APPENDIX H

FAA TOWERED AIRPORTS

Birmingham, AL (BHM)
Dothan, AL (DHN)
Huntsville Madison County, AL (HSV)
Mobile Bates Field, AL (MOB)
Montgomery Dannelly Field, AL (MGM)

Tuscaloosa Van De Graaf, AL (TCL)
Anchorage International, AK (ANC)
Anchorage Lake Hood SPB, AK (LHD)
Anchorage Merrill, AK (MRI)
Bethel, AK (BET)

Fairbanks International, AK (FAI)
Juneau, AK (JNU)
Kenai Municipal, AK (ENA)
King Salmon, AK (AKN)
Kodiak, AK (ADQ)

Deer Valley, AZ (DVT)
Falcon/Mesa, AZ (FFZ)
Goodyear, AZ (GYR)
Grand Canyon Municipal, AZ (GCN)
Phoenix Sky Harbor Intl., AZ (PHX)

Prescott, AZ (PRC)
Scottsdale, AZ (SDL)
Tuscon, AZ (TUS)
Fayetteville Drake Field, AR (FYV)
Fort Smith Municipal, AK (FSM)

Little Rock Adams Field, AR (LIT)
Texarkana, AR (TXK)
Bakersfield Meadows Field, CA (BFL)
Burbank, CA (BUR)
Carlsbad Palomar, CA (CRQ)

Chico, CA (CIC)
Chino, CA (CNO)
Concord, CA (CCR)
El Monte, CA (EMT)
Fresno Air Terminal, CA (FAT)

Fullerton Municipal, CA (FUL)
Hawthorne, CA (HHR)
Hayward, CA (HWD)
La Verne Brackett, CA (POC)
Lancaster Fox Airport, CA (WJF)

Livermore Municipal, CA (LVK)
Long Beach, CA (LGB)
Los Angeles International, CA (LAX)
Modesto City County, CA (MOD)
Monterey, CA (MRY)

Napa County, CA (APC)
Oakland International, CA (OAK)
Ontario, CA (ONT)
Oxnard Ventura County, CA (OXR)
Palm Springs Municipal, CA (PSP)

Palmdale, CA (PMD)
Palo Alto, CA (PAO)
Redding, CA (RDD)
Riverside Municipal, CA (RAL)
Sacramento Executive, CA (SAC)

Sacramento Metro, CA (SMF)
Salinas Municipal, CA (SNS)
San Carlos, CA (SQL)
San Diego Brown Field, CA (SDM)
San Diego Gillespi, CA (SEE)

San Diego Lindberg, CA (SAN)
San Diego Montgomery, CA (MYF)
San Francisco, CA (SFO)
San Jose International, CA (SJC)
San Jose Reid Hillview, CA (RHV)

San Luis Obispo, CA (SBP)
Santa Ana, CA (SNA)
Santa Barbara, CA (SBA)
Santa Maria Public, CA (SMX)
Santa Monica, CA (SMO)

Santa Rosa Sonoma County, CA (STS)
South Lake Tahoe, CA (TVL)
Stockton, CA (SCK)
Torrance Municipal, CA (TOA)
Van Nuys, CA (VNY)

Aspen Pitkin County, CO (ASE)
Broomfield Jefferson County, CO (BJC)
Colorado Springs, CO (COS)
Denver Stapleton International, CO (DEN)
Denver/Centennial, CO (APA)

Grand Junction, CO (GJT)
Pueblo, CO (PUB)
Bridgeport, CT (BDR)
Danbury Municipal, CT (DXR)
Groton Trumbull, CT (GON)

Hartford Brainard, CT (HFD)
New Haven, CT (HVN)
Windsor Locks, CT (BDL)
Wilmington Greater Wilmington, DE (ILG)
Washington National, DC (DCA)

Craig Field Jacksonville, FL (CRG)
Daytona Beach, FL (DAB)
Fort Lauderdale, FL (FLL)
Fort Lauderdale Executive, FL (FXE)
Fort Myers Page Field, FL (FMY)

Fort Myers Regional, FL (RSW)
Gainesville, FL (GNV)
Hollywood, FL (HWO)
Jacksonville International, FL (JAX)
Key West, FL (EYW)

Melbourne, FL (MLB)
Miami International, FL (MIA)
Opa Locka, FL (OPF)
Orlando Executive, FL (ORL)
Orlando International Airport, FL (MCO)

Panama City Bay County, FL (PFN)
Pensacola, FL (PNS)
Pompano Beach Airpark, FL (PMP)
Sarasota Bradenton, FL (SRQ)
St. Petersburg Clearwater, FL (PIE)

St. Petersburg Whitt, FL (SPG)
Tallahassee, FL (TLH)
Tamiami, FL (TMB)
Tampa International, FL (TPA)
Vero Beach, FL (VRB)

West Palm Beach, FL (PBI)
Albany, GA (ABY)
Atlanta DeKalb Peachtree, GA (PDK)
Atlanta Fulton County, GA (FTY)
Atlanta International, GA (ATL)

Augusta, GA (AGS)
Columbus, GA (CSG)
Macon Lewis B. Wilson, GA (MCN)
Savannah Municipal, GA (SAV)
Hilo General Lyman Field, HI (ITO)

Honolulu, HI (HNL)
Kahului, HI (OGG)
Kona Ke Ahole, HI (KOA)
Lihue, HI (LIH)
Molokai, HI (MKK)

Boise, ID (BOI)
Idaho Falls Fanning Field, ID (IDA)
Lewiston, ID (LWS)
Pocatello, ID (PIN)
Twin Falls, ID (TWF)

Alton Civic Memorial, IL (ALN)
Aurora Municipal, IL (ARR)
Bloomington Normal, IL (BMI)
Carbondale, IL (MDH)
Champaign University of Illinois, IL (CMI)

Chicago Du Page, IL (DPA)
Chicago Meigs, IL (CGX)
Chicago Midway, IL (MDW)
Chicago O'Hare International, IL (ORD)
Chicago Palwaukee, IL (PWK)

Decatur, IL (DEC)
East St. Louis Bi State Park, IL (CPS)
Moline, IL (MLI)
Peoria, IL (PIA)
Rockford, IL (RFD)

Springfield Capital, IL (SPI)
Bloomington Monroe County, IN (BMG)
Evansville, IN (EVV)
Fort Wayne, IN (FWA)
Indianapolis International, IN (IND)

Lafayett Purdue University, IN (LAF)
Muncie Delaware County, IN (MIE)
South Bend, IN (SBN)
Terre Haute, IN (HUF)
Cedar Rapids, IA (CID)

Des Moines Municipal, IA (DSM)
Dubuque, IA (DBQ)
Sioux City Municipal, IA (SUX)
Waterloo, IA (ALO)
Hutchinson, KS (HUT)

Olathe, KS (OJC)
Salina, KS (SLN)
Topeka Forbes AFB, KS (FOE)
Wichita Mid Continent, KS (ICT)
Cincinnati Greater, KY (CVG)

Lexington, KY (LEX)
Louisville Bowman, KY (LOU)
Louisville Standiford, KY (SDF)
Alexandria, LA (ESF)
Baton Rouge Ryan Field, LA (BTR)

Houma, LA (HUM)
Lafayette, LA (LFT)
Lake Charles, LA (LCH)
Monroe, LA (MLU)
New Orleans Lakefront, LA (NEW)

New Orleans Moisant, LA (MSY)
Shreveport, LA (SHV)
Shreveport Downtown, LA (DTN)
Bangor International, ME (BGR)
Portland, ME (PWM)

Baltimore Washington Intl., MD (BWI)
Camp Springs Andrews AFB, MD (ADW)
Hagerstown, MD (HGR)
Bedford, MA (BED)
Beverly Municipal, MA (BVY)

Boston Logan, MA (BOS)
Hyannis, MA (HYA)
Lawrence, MA (LWM)
Nantucket Memorial, MA (ACK)
New Bedford, MA (EWB)

Norwood, MA (OWD)
Westfield, MA (BAF)
Worcester, MA (ORH)
Ann Arbor Municipal, MI (ARB)
Battle Creek, MI (BTL)

Detroit City, MI (DET)
Detroit Metro Wayne County, MI (DTW)
Detroit Willow Run, MI (YlP)
Flint Bishop, MI (FNT)
Grand Rapids, MI (GRR)

Jackson Reynolds Municipal, MI (JXN)
Kalamazoo, MI (AZO)
Lansing, MI (LAN)
Muskegon, MI (MKG)
Pontiac, MI (PTK)

Saginaw Tri City, MI (MBS)
Traverse City, MI (TVC)
Duluth, MN (DLH)
Minneapolis Crystal, MN (MlC)
Minneapolis Flying Cloud, MN (FCM)

Minneapolis St. Paul Intl., MN (MSP)·
Rochester, MN (RST)
St. Paul, MN (STP)
Greenville Municipal, MS (GLH)
Gulfport, MS (GPT)

Jackson Hawkins, MS (HKS)
Jackson Municipal Airport, MS (JAN)
Meridian Key, MS (MEl)
Columbia Regional, MO (COU)
Joplin, MO (JLN)

Kansas City International, MO (MCI)
Kansas City Municipal, MO (MKC)
Springfield, MO (SGF)
St. Joseph, MO (STJ)
St. Louis International, MO (STL)

St. Louis Spirit of St. Louis, MO (SUS)
Billings, MT (BIL)
Great Falls, MT (GTF)
Helena, MT (HLN)
Missoula, MT (MSO)

Grand Island, NE (GRI)
Lincoln Municipal, NE (LNK)
Omaha, NE (OMA)
Las Vegas McCarran International, NV (LAS)
North Las Vegas, NV (VGT)

Reno International, NV (RNO)
Lebanon, NH (LEB)
Manchester, NH (MHT)
Atlantic City, NJ (ACY)
Caldwell, NJ (CDW)

Morristown, NJ (MMU)
Newark, NJ (EWR)
Teterboro, NJ (TEB)
Trenton, NJ (TTN)
Albuquerque International, NM (ABQ)

Roswell, NM (ROW)
Santa Fe, NM (SAF)
Albany County, NY (ALB)
Binghamton Broome County, NY (BGM)
Buffalo International, NY (BUF)

Elmira, NY (ELM)
Farmingdale, NY (FRG)
Islip McArthur, NY (ISP)
Ithaca Tompkins County, NY (ITH)
John F. Kennedy International, NY (JFK)

La Guardia, NY (LGA)
Niagara Falls, NY (IAG)
Poughkeepsie Dutchess County, NY (POU)
Rochester Monroe County, NY (ROC)
Syracuse Hancock International, NY (SYR)

Utica, NY (UCA)
White Plains Westchester, NY (HPN)
Asheville, NC (AVL)
Charlotte Douglas, NC (CLT)
Fayetteville Grannis, NC (FAY)

Greensboro Regional, NC (GSO)
Kinston, NC (ISO)
Raleigh Durham, NC (RDU)
Wilmington New Hanover County, NC (ILM)
Winston Salem, NC (INT)

Bismark, ND (BIS)
Fargo Hector Field, ND (FAR)
Grand Forks International, ND (GFK)
Minot International, ND (MOT)
Akron Canton Regional, OH (CAK)

Cincinnati Lunken, OH (LUK)
Cleveland Burke Lakefront, OH (BKL)
Cleveland Hopkins International, OH (CLE)
Columbus International, OH (CMH)
Columbus Ohio State, OH (OSU)

Dayton, OH (DAY)
Mansfield Lahm Municipal, OH (MFD)
Toledo Express, OH (TOL)
Youngstown, OH (YNG)
Clinton Sherman, OK (CSM)

Lawton Municipal, OK (LAW)
Oklahoma City Wiley Post, OK (PWA)
Oklahoma City Will Rogers, OK (OKC)
Tulsa International, OK (TUL)
Tulsa Riverside, OK (RVS)

Eugene, OR (EUG)
Hillsboro, OR (HIO)
Klamath Falls, OR (LMT)
Medford Jackson County, OR (MFR)
Portland International, OR (PDX)

Salem McNary Field, OR (SLE)
Troutdale, OR (TTD)
Allentown, PA (ABE)
Capital City/Harrisburg, PA (CXY)
Erie, PA (ERI)

Harrisburg International, PA (MDT)
Lancaster, PA (LNS)
North Philadelphia, PA (PNE)
Philadelphia International, PA (PHL)
Pittsburgh Allegheny, PA (AGC)

Pittsburgh Greater International, PA (PIT)
Reading, PA (RDG)
Wilkes Barre, PA (AVP)
Williamsport, PA (IPT)
Providence, RI (PVD)

Charleston AFB Municipal, SC (CHS)
Columbia Metropolitan, SC (CAE)
Florence City, SC (FLO)
Greenville Municipal, SC (GMU)
Greer, SC (GSP)

Rapid City, SD (RAP)
Sioux Falls Foss Field, SD (FSD)
Bristol Tri City, TN (TRI)
Chattanooga, TN (CHA)
Knoxville McGhee Tyson, TN (TYS)

Memphis International, TN (MEM)
Nashville Metropolitan, TN (BNA)
Abilene, TX (ABI)
Amarillo, TX (AMA)
Austin, TX (AUS)

Beaumont Port Arthur, TX (BPT)
Brownsville International, TX (BRO)
College Station, TX (CLL)
Corpus Christi, TX (CRP)
Dallas Addison, TX (ADS)

Dallas Love Field, TX (DAL)
Dallas Redbird, TX (RBD)
Dallas/Ft. Worth Regional, TX (DFW)
El Paso International, TX (ELP)
Fort Worth Meacham, TX (FTW)

Harlingen Industrial, TX (HRL)
Houston Hobby, TX (HOU)
Houston Intercontinental, TX (IAH)
Longview, TX (GGG)
Lubbock, TX (LBB)

McAllen, TX (MFE)
Midland, TX (MAF)
San Angelo, TX (SJT)
San Antonio International, TX (SAT)
San Antonio Stinson, TX (SSF)

Tomball D. W. Hooks, TX (DWH)
Tyler, TX (TYR)
Waco Municipal, TX (ACT)
Ogden Municipal, UT (OGD)
Salt Lake City International, UT (SLC)

Burlington International, VT (BTV)
Charlottesville Albemarle, VA (CHO)
Lynchburg, VA (LYH)
Newport News, VA (PHF)
Norfolk Regional, VA (ORF)

Richmond Byrd International, VA (RIC)
Roanoke, VA (ROA)
Washington Dulles International, VA (IAD)
St. Croix Alex Hamilton, VI (STX)
St. Thomas H. S. Truman, VI (STT)

Everett Paine Field, WA (PAE)
Moses Lake Grant, WA (MWH)
Olympia, WA (OLM)
Pasco Tri Cities, WA (PSG)
Renton, WA (RNT)

Seattle Boeing, WA (BFI)
Seattle Tacoma International, WA (SEA)
Spokane Felts Field, WA (SFF)
Spokane International, WA (GEG)
Tacoma Narrows, WA (TIW)

Walla Walla, WA (ALW)
Yakima Air Terminal, WA (YKM)
Charleston, WV (CRW)
Clarksburg Benedum, WV (CKB)
Huntington, WV (HTS)

Morgantown, WV (MGW)
Parkersburg Wood County, WV (PKB)
Wheeling, WV (HLG)
Appleton, WI (ATW)
Green Bay Austin Straubel, WI (GRB)

Janesville, WI (JVL)
Lacrosse, WI (LSE)
Madison, WI (MSN)
Milwaukee Mitchell, WI (MKE)
Milwaukee Timmerman, WI (MWG)

Oshkosh Wittman Field, WI (OSH)
Gasper, WY (CPR)
Cheyenne, WY (CYS)
San Juan International, PR (SJU)
San Juan Isla Grande, PR (SIG)

Kwajalein AAF, WK (KWA)
Pago Pago International, AS (TUT)
Martha's Vineyard, MA (MVY)-Seasonal

APPENDIX I

CONTRACT TOWERS

1. Flagstaff, Arizona (FLG)
2. Lakeland, Florida (LAL)
3. Topeka-Phillip Ballard, Kansas (TOP)
4. Owensboro-Daviees County, Kentucky (OWB)
5. Paducah Barkley Field, Kentucky (PAH)
6. Cape Girardeau, Missouri (CGI)
7. Nashua, New Hampshire (ASH)
8. Farmington Municipal, New Mexico (FMN)
9. Hobbs Lea, New Mexico (HOB)
10. Cleveland-Cuyahoga County, Ohio (CGF)
11. Ardmore Municipal, Oklahoma (ADM)
12. Enid Woodring Memorial, Oklahoma (WDG)
13. Pendleton, Oregon (PDT)
14. Myrtle Beach, South Carolina (CRE)
15. Laredo, Texas (LRD)
16. Bellingham, Washington (BLI)
17. Lewisburg-Greenbrier, West Virginia (LWB)

APPENDIX J

TERMINAL CONTROL AREAS AND AIRPORT RADAR SERVICE AREAS

Birmingham, AL (BHM)
Huntsville Madison County, AL (HSV)
Mobile Bates Field, AL (MOB)
Montgomery Dannelly Field, AL (MGM)
Anchorage International, AK (ANC)

Phoenix Sky Harbor Intl., AZ (PHX)
Tucson, AZ (TUS)
Fort Smith Municipal, AR (FSM)
Little Rock Adams Field, AR (LIT)
Burbank, CA (BUR)

Los Angeles International, CA (LAX)
Monterey, GA (MRY)
Oakland International, CA (OAK)
Ontario, CA (ONT)
Palm Springs Municipal, CA (PSP)

Sacramento Metro, CA (SMF)
San Diego Lindberg, CA (SAN)
Santa Barbara, CA (SBA)
San Francisco, CA (SFO)
Colorado Springs, CO (COS)

Denver Stapleton International, CO (DEN)
Windsor Locks, CT (BDL)
Washington National, DC (DCA)
Daytona Beach, FL (DAB)
Fort Lauderdale, FL (FLL)

Fort Myers Regional, FL (RSW)
Jacksonville International, FL (JAX)
Miami International, FL (MIA)
Orlando International Airport, FL (MCO)
Pensacola, FL (PNS)

Sarasota Bradenton, FL (SRQ)
Tallahassee, FL (TLH)
Tampa International, FL (TPA)
West Palm Beach, FL (PBI)
Atlanta International, GA (ATL)

Augusta, GA (AGS)
Columbus, GA (CSG)
Macon Lewis B. Wilson, GA (MCN)
Savannah Municipal, GA (SAV)
Honolulu, HI (HNL)

Kahului, HI (OGG)
Boise, ID (BOI)
Champaign University of Illinois, IL (CMI)
Chicago Midway, IL (MDW)
Chicago O'Hare International, IL (ORD)

Moline, IL (MLI)
Peoria, IL (PIA)
Rockford, IL (RFD)
Springfield Capital, IL (SPI)
Evansville, IN (EVV)

Fort Wayne, IN (FWA)
Indianapolis International, IN (IND)
South Bend, IN (SBN)
Cedar Rapids, IA (CID)
Des Moines Municipal, IA (DSM)

Witchita Mid Continent, KS (ICT)
Cincinnati Greater, KY (CVG)
Lexington, KY (LEX)
Louisville Standiford, KY (SDF)
Baton Rouge Ryan Field, LA (BTR)

Lafayette, LA (LFT)
Lake Charles, LA (LCH)
Monroe, LA (MLU)
New Orleans Moisant, LA (MSY)
Shreveport, LA (SHV)

Bangor International, ME (BGR)
Portland, ME (PWM)
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Camp Springs Andrews AFB, MD (ADW)
Boston Logan, MA (BOS)

Detroit Metro Wayne County, MI (DTW)
Flint Bishop, MI (FNT)
Grand Rapids, MI (GRR)
Kalamazoo, MI (AZO)
Lansing, MI (LAN)

Muskegon, MI (MKG)
Saginaw Tri City, MI (MBS)
Minneapolis St. Paul, MN (MSP)
Gulfport, MS (GPT)
Jackson Municipal Airport, MS (JAN)

Kansas City International, MO (MCI)
St. Louis International, MO (STL)
Billings, MT (BIL)
Great Falls, MT (GTF)
Lincoln Municipal, NE (LNK)

Omaha, NE (OMA)
Las Vegas McCarran Intl. NV (LAS)
Reno International, NV (RNO)
Atlantic City, NJ (ACY)
Newark, NJ (EWR)

Albuquerque International, NM (ABQ)
Albany County, NY (ALB)
Binghamton Broome County, NY (BGM)
Buffalo International, NY (BUF)
Elmira, NY (ELM)

John F. Kennedy International, NY (JFK)
La Guardia, NY (LGA)
Rochester Monroe County, NY (ROC)
Syracuse Hancock International, NY (SYR)
Asheville, NC (AVL)

Charlotte Douglas, NC (CLT)
Fayetteville Grannis, NC (FAY)
Greensboro Regional, NC (GSO)
Raleigh Durham, NC (RDU)
Wilmington New Hanover County, NC (ILM)

Fargo Hector Field, ND (FAR)
Akron Canton Regional, OH (CAK)
Cleveland Hopkins Intl., OH (CLE)
Columbus International, OH (CMH)
Dayton, OH (DAY)

Toledo Express, OH (TOL)
Youngstown, OH (YNG)
Oklahoma City Will Rogers, OK (OKC)
Tulsa International, OK (TUL)
Portland International, OR (PDX)

Allentown, PA (ABE)
Capital City/Harrisburg, PA (CXY)
Erie, PA (ERI)
Philadelphia International, PA (PHL)
Pittsburgh Greater International, PA (PIT)

Wilkes Barre, PA (AVP)
Providence, RI (PVD)
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Columbia Metropolitan, SC (CAE)
Greer, SC (GSP)

Bristol Tri City, TN (TRI)
Chattanooga, TN (CHA)
Knoxville McGhee Tyson, TN (TYS)
Memphis International, TN (MEM)
Nashville Metropolitan, TN (BNA)

Abilene, TX (ABI)
Amarillo, TX (AMA)
Austin, TX (AUS)
Beaumont Port Arthur, TX (BPT)
Corpus Christi. TX (CRP)

Dallas Love Field, TX (DAL)
Dallas/Ft. Worth Regional, TX (DFW)
El Paso International, TX (ELP)
Houston Hobby, TX (HOU)
Houston Intercontinental, TX (IAH)

Longview, TX (GCG)
Lubbock, TX (LBB)
Midland, TX (MAF)
San Antonio International, TX (SAT)
Salt Lake City Intl., UT (SLC)

Burlington International, VT (BTV)
Norfolk Regional, VA (ORF)
Richmond Byrd International, VA (RIC)
Roanoke, VA (ROA)
Washington Dulles International, VA (IAD)

Seattle Tacoma International, WA (SEA)
Spokane International, WA (GEG)
Charleston, WV (CRW)
Huntington, WV (HTS)
Green Bay Austin Straubel, WI (GRB)

Madison, WI (MSN)
Milwaukee Mitchell, WI (MKE)
Agana NAS, SP (GUM)
San Juan International, PR (SJU)

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